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Editorial.

THE SCAPEGOAT.

THE *Spectator* of 22nd March has a brilliant article on the "Cardinal Principle of Administration," which, while it has no special bearing on our profession, we commend to the attention of our readers, it is so practical and so cogent in its reasoning. It begins thus: "We wish that some day, when there is comparatively little business before the Cabinet, Lord Salisbury would read to his colleagues the eighteenth chapter of Exodus, beginning at the thirteenth verse. Such reading would, we believe, convey a lesson much needed by a certain number of our Cabinet Ministers." Now our readers must not run away with the notion that the *Spectator* is in a goody-goody frame of mind, and wishes to preach to Lord Salisbury and his colleagues or indulge in pious platitudes. For the next sentence goes on to say: "In that chapter is laid down, with a clearness and precision which no subsequent writers on public affairs have ever bettered, the true principle of civil administration." This may take the breath away from our readers for a moment, but they will recover from the shock if they read on to the end. Indeed they will, being all honest fellows, rise from the perusal of the article, with its copious quotations from the ancient text, happier and more contented men, feeling that new life and new significance have been imported into what they may have been accustomed to regard as a somewhat dreary and vapid passage, only to be listened to as a task or a concession to ecclesiastical pressure. Writers who, like the writer in the *Spectator*, bring out the force and vitality of ancient and venerable books, confer a benefit on their fellows, because they inspire them with new zeal and enthusiasm; they show what an inheritance we possess in a corner of our vineyard, which superstitious reverence has tended to obscure from us; they show that human nature has remained pretty much the same for thousands of years, in spite of the most extraordinary differences in externals, in manners of thought and speech, and they thus help to bridge over the gulf of centuries. Since reading this article in the *Spectator*, we have ourselves been led to renew our acquaintance with the books of the

Old Testament, and we have come upon a passage which we think pregnant with meaning for the men of the present day, and which seems to have a particularly sombre significance for the members of our profession. If our readers will turn to the sixteenth chapter of the Book of Leviticus, they will find at the twentieth verse the following words: "And when he hath made an end of reconciling the holy place, and the tabernacle of the congregation, and the altar, he shall bring the live goat, and Aaron shall lay both his hands upon the head of the live goat: and confess over him all the iniquities of the children of Israel, and all their transgressions in all their sins, putting them upon the head of the goat, and shall send him away by the hand of a fit man into the wilderness. And the goat shall bear upon him all their iniquities unto a land not inhabited, and he shall let go the goat in the wilderness." This passage, describing the ancient Jewish ceremony of purification, is just as applicable to present-day practices as it was in the time of Moses. Mistakes have been made, the people have transgressed, and a victim has to be found. It is useless to assail the medical bull; he has sharp horns, and can use them to some purpose in goring his would-be assailant: it is worse than useless, it is dangerous, to attempt to victimise the military elephant; he has a powerful and far-reaching trunk, and he has long sharp tusks, which produce a fearful wound; besides, he has a nasty trick of trampling on his assailants when he is infuriated, and his enormous bulk makes his tread fatal to everything that opposes itself to him. Where is there to be found, then, an easy and defenceless victim? Of course it is the veterinary goat. He has horns, it is true, but they curve backwards; he has small bulk and his impact need not be dreaded; he can only butt with his head, but it is easy to avoid him. Here is a convenient victim. Let the high priests of the War Office confess over him all the iniquities of the British people, and all their transgressions in all their sins, and let them get quit of him as quickly as possible. Observe the significance of the phrase "by the hand of a fit man." Don't do the unpleasant work yourself; get some one who is not troubled with scruples to do it for you—it is so much nicer and easier. Observe further: "The goat shall bear upon him all their iniquities unto a land not inhabited, and he" (that is the fit man—the man not troubled with scruples) "shall let go the goat in the wilderness." Now, a wilderness is a place where there is no superabundance of food; it is a place not inhabited, there is no cultivation, the goat must take what he can find. You say he will probably find nothing to eat? What does it matter? Let him starve—he is only a goat.

If our readers think we have written somewhat bitterly, our excuse must be the shabby treatment meted out to us by the military authorities. We are told that we are unfit to hold appointments in India because we are ignorant of native languages, yet on

examination of the Indian Army List our readers will find that of the seventeen veterinary surgeons employed by the Government in India twelve have qualified in this respect,—surely a very fair average. Of the minority some are juniors who may be expected to qualify before long. Besides, we compare very favourably with the Medical Department in this respect. Then there is the added humiliation in South Africa of the subjection of veterinary surgeons to an artillery officer. Could insult go much further? If the nation would but think that a very large portion of its wealth, home and colonial, consists in its flocks and herds, that special training and special knowledge are required for the proper treatment of the diseases that ravage these herds, that no help is given to Veterinary Colleges by Government, that we have practically no endowments, that legacies are an unknown luxury, perhaps we should receive more reasonable, not to say more humane treatment. In the meantime we serve but one purpose, we are convenient scapegoats.

Original Papers.

REMARKS ON THE RELATIONS OF HUMAN AND BOVINE TUBERCULOSIS.[1]

BY C. H. CATTLE, M.D. LOND., M.R.C.P., ASSISTANT PHYSICIAN TO THE NOTTINGHAM GENERAL HOSPITAL.

In addition to the danger of inhaling the infection of tuberculosis it has until lately been believed that human beings may also be infected through the digestive passages by the consumption of meat or milk derived from tuberculous animals; but Professor Koch has startled the Congress recently held in London and the world by declaring that the risk of this occurrence is extremely slight, and in his opinion no measures to prevent it are necessary.

What, then, are our reasons for believing in the identity of human and bovine tuberculosis, and that the disease can be transmitted from one species to the other?

1. The bacilli found in each case are extremely alike both in their form, their staining reactions, and their mode of growth under artificial cultivation.

2. These bacilli, whether of bovine or human origin, produce typical tuberculosis when injected into rabbits and guinea-pigs.

3. Tuberculin prepared from human tubercle bacilli produces a characteristic reaction when injected into tuberculous cattle, just as it does when injected into tuberculous man.

Objections can be urged against each of these statements. The similarity of the bacilli, it is said, does amount to identity of form. The bovine bacillus is not beaded like the human one, and is also shorter and thicker. In pure culture there are some differences in the mode of growth, and the bovine bacillus will not grow on glycerine-agar, while the human will.

[1] Extracts from a paper read before the Nottingham Medico-Chirurgical Society.

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Communicability of Human Tuberculosis to Bovines.

A fact, admitted by all observers, is that while both bacilli are pathogenic for animals, the bovine bacillus is much more virulent than the human. This fact, however, may eventually turn out unfavourable to Koch's views. His argument is based on the results of experiments in which he found calves very susceptible to bovine tuberculous material, whereas these animals were not susceptible to infection by human material, and swine but very slightly. But it is a matter of experience that man is, as a rule, liable to the diseases which are common to the domestic animals, and if bovine tubercle is virulent for a large number of different animals it strengthens the probability that it is virulent for man also. With regard to the tuberculin reaction Koch explains that, although the bacilli are different, they belong to the same group, the members of which give a common reaction with toxins. In support of this statement he points out that typhoid serum agglutinates cultures not only of typhoid bacilli, but also of paratyphoid [a form of colon bacilli]. As regards pathological and experimental evidence, the conclusion seems to be justified that the differences between human and bovine bacilli are those of variety rather than of species, such variation being due to the soil on which the organism grows.

Other observers, however, have not met with such uniformly negative results after attempts to communicate human tubercle to cattle. Ravenal of Philadelphia [1] inoculated intraperitoneally four calves with human sputum; three of these became tuberculous, two showing extensive lesions of true *Perlesucht* character. Contrary to Koch's experience, he found swine very susceptible to infection by human sputum. Lately Professor Delépine [2] has succeeded in giving human tubercle to the calf. Dr. Sidney Martin fed calves on bovine and human material. Those fed with bovine material were easily infected. The experiments with human material, while not being entirely negative, failed to communicate tubercle in two cases out of six, while in the other four there were lesions of limited extent in Peyer's patches and the mesenteric glands. Accidental infection of cattle, pigs, and even fowls, by means of the sputum of phthisical attendants, has been thought possible, and cases in support have been cited, but, as we are not told that all other sources of infection were excluded, the evidence is not very convincing.

Communicability of Bovine Tuberculosis to Man.

We may now turn from the possibility of communicating tuberculosis from man to cattle to the far more important consideration whether transmission of the disease from cattle to man can take place, and whether the danger of contracting tuberculosis from meat and milk is real and substantial. I have nothing to say about the danger from meat, because meat inspection is practised by our authorities; and even if tuberculous meat escapes the inspector, the risk is so much diminished by cooking that the transmission of tuberculosis by this means is so rare as hardly to constitute a substantial danger. Indeed, Dr. Sidney Martin [3] tells us that meat itself very rarely contains tubercle bacilli, and that danger consists only in its being contaminated by knives, cloths, &c., which have been in contact

[1] *Lancet*, August 17th, 1901.
[2] *British Medical Journal*, November 1901.
[3] Allbutt's *System*, vol. ii. p. 30.

with tuberculous organs. Nocard [1] was unable to infect animals by feeding with raw flesh from highly tuberculous beasts, and even inoculation with juice from the same generally failed. The case is different as regards milk, because it is much more frequently taken uncooked, and the general opinion is that it is a fertile source of the tuberculosis of childhood. This belief is supported by the findings of the Royal Commission in 1895. We are told that something like 30 per cent. of milch cows—kept, as is usual, in confinement—are tuberculous, but that only the milk of cows with tuberculosis of the udder is infective. Udder disease is said to exist in 2 per cent. of cows; but this estimate may be too high, for Mr. Lloyd,[2] veterinary surgeon to the Manchester Corporation, after examining 9576 animals, found this affection in 0·5 per cent., and appears to consider this a fair average for the whole country. Tuberculous milk is dangerous in proportion to the number of bacilli contained in it, and it is easy to exaggerate the infectiveness of milk, unless we remember that the infection is very much diluted by the mixing of milk. Tuberculous milk has been amply shown to be infective for animals. Knowing this, we find in the bodies of childeren lesions in the intestine, glands, or peritoneum, and we argue thus: All children drink milk, some milk is infective, therefore some children die of infection by milk. This conclusion may be correct, but in forming it there is something we have not taken into account.

Koch [3] has said: "It is just as likely these cases of intestinal tuberculosis were caused by the widely propagated bacilli of human tuberculosis." In breathing a germ-laden atmosphere tubercle bacilli may be deposited in the mouth or nose and afterwards swallowed mixed with mucus, or even after being inhaled they may be expectorated and swallowed. It is not only milk that goes into the mouths of children; they grub about on all-fours, plastering their fingers with the tuberculous dust hidden away in inaccessible corners, and then put their fingers in their mouths; they play with the spittoons and handkerchiefs of phthisical relatives; jellies, blancmanges, and other food are left for hours, if not days, beside a coughing patient, and these, as well as all other infection lying about, are finally eaten by the children.

ABDOMINAL TUBERCULOSIS IN CHILDREN.

There is a pretty general belief among the medical profession that tuberculosis in young children usually affects the abdominal organs primarily, and this belief is fostered by the reports of the Registrar-General, which show during the first five years of life a heavy mortality from tabes mesenterica. This disease—true mesenteric tuberculosis—can hardly be diagnosed clinically, the term being apparently used to signify a disease characterised by diarrhœa, wasting and tumid belly, the so-called "consumption of the bowels" of the laity. Sir Richard Thorne-Thorne in his 1898 lectures uses these very fallacious statistics to prove his point that infantile tuberculosis is due to milk. He points out that while the death-rate for phthisis, owing to improved hygienic conditions, has declined during the last fifty years as much as 50 per cent., that for tabes mesenterica for children under five has remained practically stationary, and has

[1] *The Animal Tuberculoses*, p. 91 *et seq.*
[2] *Lancet*, August 3rd, 1901.
[3] "The Fight against Tuberculosis," Address to the British Congress, *British Medical Journal*, July 27th, 1901.

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even increased as much as 27 per cent. for children under one year. Children, he says, have had the benefit equally with adults of improved sanitation, therefore some other cause, not affecting the phthisis death-rate, has been operative in causing the increased tuberculous death-rate in children, and this cause is probably infective milk. There are observers, however, as fully convinced as Sir R. Thorne-Thorne of the dangers of milk who do not accept the figures on which he bases his conclusion. Dr. J. M'Fadyean, who defended the milk theory against Professor Koch at the Congress, says: "The Registrar-General's returns do not afford much trustworthy information with regard to the number of cases of primary intestinal tuberculosis, and are absolutely worthless as an indication of the extent to which human beings are infected by milk.[1]

The only reliable statistics open to us are those based on necropsies. The results thus obtained are very striking, and do not lend much support to the doctrine that abdominal tuberculosis is relatively common during the milk-drinking period. The records of several large children's hospitals for a number of years back have been analysed by independent observers—Dr. Shennan of Edinburgh, Drs. Still, Carr, Colman, Guthrie, and others, in London. The investigations concern over 2000 necropsies, and the results in each case are strikingly similar.

It is shown in the case of children under twelve years of age dying in hospital, first, that nearly one-third of the deaths are due to tuberculosis, thus supporting the general opinion that the disease is common in childhood; but, secondly, it is also shown that at all the age periods up to five years tuberculosis primarily affecting the lungs or thoracic glands is at least twice as common as the same affection of the intestine or abdominal glands.

After five years of age tuberculosis is much less common, and primary infection in the two cavities is more nearly equal. The most fatal period of tuberculosis is the second year of life, and this is the very period when we ought to find most evidence of primary infection through the intestine. At this age Dr. Still[2] found 38 cases of primary thoracic infection and 15 of primary abdominal; Dr. Shennan's figures are 57 and 22.[3] These figures show a preponderance of chest tuberculosis in the proportion of nearly 3 to 1, at an age when milk is largely drunk.

Putting together the figures of these two observers, and taking all cases up to six years of age, we get 281 primarily thoracic and 91 primarily abdominal. And if we look at the earliest period of life, under one year, we find the figures, instead of confirming the impression given by the Registrar-General's reports that abdominal tuberculosis is especially fatal at that time of life, absolutely contradict it; for Dr. Still found primary chest disease in 18, abdominal in 5; Dr. Shennan, chest 21, abdominal 4. Here the figures are 4 to 1 in favour of the chest. Dr. Carr examined into the cause of 330 deaths in children, 30 per cent. of which were due to tuberculosis, and concludes:[4] "Tuberculous disease starts much more frequently in the thorax than in the abdomen, and certainly far more often in the thoracic than in the mesenteric glands." His figures are 65·8 per cent. starting in the thorax, as against 16·7 per cent. in the abdomen. Dr. Coleman says:[5] "While not doubting the infection by milk in some cases,

[1] Address to the Congress, *British Medical Journal*, August 3rd, p. 323.
[2] *Ibid.*, August 19th, 1899.
[3] *Edinburgh Hospital*, 1900.
[4] Allbutt's *System*, vol. iii. p. 650.
[5] *British Medical Journal*, vol. ii. 1893.

I am led to attach more importance to the condition of the thoracic glands, as the process was more advanced in them as a rule than in the mesenteric glands." There are two other sites besides the chest and abdomen in which tuberculosis may have its primary seat, and which conceivably may be infected either by inhalation or ingestion. One of these is the middle ear, which Dr. Still [1] found affected fifteen times, and suggests this is really an inhalation tuberculosis, as the Eustachian tube is more closely related with the respiratory than the alimentary passages. The other site is the glands of the neck, which probably become tuberculous by infection through the tonsils or other parts of the fauces. Dr. Shennan claims this mode of infection as due to food, but it is, in my opinion, just as probably aërial in origin, and, anyway, cannot prove very much in favour of milk infection, being probably more common in later than in earlier childhood. In 43 of Dr. Still's cases, healed tuberculous regions were found, the patient having died of some other disease. In these healed lesions the proportion of thoracic to abdominal disease was fairly well maintained, being 26 of the former to 16 of the latter. So far as the evidence goes, we may say that the tendency of tubercle to become obsolescent is not decidedly more marked in the one situation than in the other.

From what has been said it must not be concluded that cases of tuberculosis in childhood can always be ascertained clinically to be of pulmonary or intestinal type respectively. Nearly half the total number appear clinically as meningitis, the primary lesion, whether thoracic or abdominal, being often latent. What is shown by the figures—and I think conclusively—is that primary infection takes place far more often by the respiratory than by the alimentary passages. And just as primary chest infection is commoner than primary abdominal, so also a larger proportion of secondary meningeal infection comes from a thoracic than from an abdominal source. Therefore clinically, and excluding meningitis, we ought to find pulmonary phthisis more common than abdominal, and this, I think, is what we do find. During my last six months' practice in the out-patient room, I have not seen a single case in which there were reasonable grounds for a diagnosis of abdominal tuberculosis, while I have met with a considerable number of children with local and constitutional signs of the pulmonary form; one of these, aged two years, being probably infected by a phthisical mother. Experience in the wards points in the same direction, and, I think, in private practice also, if any one kept careful note of his cases, he would find at the end of a twelvemonth he had seen more cases of pulmonary phthisis in children than abdominal.

CONCLUSIONS.

What follows from this line of argument? Well, we cannot as yet deny the possibility of infection by milk; still enough has been said to show that the assumption that the frequency of tuberculosis in early life is chiefly due to tuberculous milk is in one direction too narrow and in another erroneous. An exclusive milk theory, while it ignores the greater incidence of tuberculosis on the lungs than on the bowels in young children, fails also to take account of other sources of infection. There can be no doubt that certain infantile diseases — measles, whooping-cough, bronchitis, broncho-pneumonia—serve as powerful predisposing causes to tuberculosis

[1] *Practitioner*, July 1901, p. 94.

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mortality. They leave behind them constitutional weakness, catarrh of the respiratory passages, and often of the intestinal as well. Under these conditions the widely disseminated bacilli of human tuberculosis gain a footing, attaching themselves to the most susceptible organs—in a majority of cases the lungs or their related glands, in other cases to the intestine, ear, or neck glands. Milk may be responsible for some cases, but the fact that thoracic tuberculosis is so common at an early age suggests the conclusion that the human bacillus (in the one case inhaled, in the other swallowed) mixed with the bodily secretions or with food, is the cause of chest trouble in one case and of abdominal in another.

Koch has told us that while secondary infection of the intestine is admittedly very common, primary infection of that tube with tuberculosis is exceedingly rare. This conclusion, however, is not in accordance with British experience as regards disease in children.

In 66 cases of Dr. Shennan's, 45 were found with ulceration of the intestine prior to the infection of the glands of the mesentery; but in a minority the glands were affected with little or no lesion of the bowel, thus tending to support the view that bacilli may sometimes find their way through a mucous surface without leaving traces there of primary inoculation. It is said [1] that in Germany the use of boiled milk is very common, if not the rule, while with us it is the exception; and this difference of treatment would therefore, if milk be the cause of the disease, explain the greater frequency of primary intestinal ulceration among us.

The following case has often been quoted in support of the belief that tuberculosis can be acquired from milk. At a school for girls in France there occurred within three months 11 cases of tuberculosis, of which 5 were fatal. In several of the cases the site of the infection appeared to be intestinal. The milk used during the period was obtained from a cow affected with tubercle of the udder and internal organs. There is other evidence of at any rate the occasional innocuousness of tuberculous milk. The following occurrence was communicated to me by Professor Clifford Allbutt, with his permission to publish the facts. Some years ago, when living at Meanwood, near Leeds, he used to keep a small herd of Guernseys, among which was a prize cow he had purchased for a high price. This cow had been coughing for many weeks without any particular attention being paid to the fact, when at last it was noticed that her milk did not look right. On examination disease of the udder was found, no doubt at an advanced stage, seeing that the milk was noticeably altered in appearance. The milk contained swarms of tubercle bacilli, and had been consumed mixed with that of the other cows for a long period by over twenty persons, ten of these being children. This disclosure naturally gave Dr. Allbutt considerable anxiety for a time. But he says, "No one was one penny the worse, except myself, for the loss of my pedigree cow."

From instances like the foregoing it is difficult to draw any general conclusion as to the danger of drinking tuberculous milk. The evidence, however, tends to show that such milk is not highly infective when diluted with the milk of healthy cows, and that some persons are likely to show a much higher degree of susceptibility than others. Nocard, an eminent French authority, quotes several cases of tuberculosis of the intestines in

[1] Shennan, *Scottish Medical and Surgical Journal*, 1901, p. 324. Dr. Coutts, however (Allchin's *Manual of Medicine*, vol. i.), expresses the opinion that primary tuberculosis of the intestinal mucous membrane is rare.

young persons traced with a high degree of probability to milk, but he also says, "Ingestion only succeeds in giving tuberculosis when the ingested material is very rich in bacilli." [1]

As regards the spread of tuberculosis, we seem to be going through much the same change of thought as we have gone through with regard to the spread of typhoid fever. In this disease we used to say that case-to-case infection was very rare, and that infection from a common source was the rule. We now believe that the disease often arises from case-to-case infection. In the same way we have slowly come round to the idea that tuberculosis in adults arises directly or indirectly from case-to-case infection. During the last few years the belief has become general that the tuberculosis of childhood is due mainly or entirely to a common source of infection, namely, milk. Are we not now in process of recognising that here again tuberculosis is mainly caused by infection derived directly or indirectly from a person affected by the disease?

TURPENTINE AS AN ANTISEPTIC, ESPECIALLY IN CASES OF PARTURITION.[2]

BY A. BOYD, F.R.C.V.S., MELROSE.

I do not intend to pose myself on a high scientific pinnacle as regards turpentine; neither do I intend to make a long-winded paper like a sermon of the olden days. I only want to tell you what I have found in practice regarding turpentine as a therapeutic agent.

You are all aware that turpentine is got from the pine or fir tree, and I am sure all of you are well aware of the process necessary for its manufacture.

You all know turpentine, and to the mind the word turpentine conveys an agent to blister or at least to cause irritation when applied to the skin. Turpentine applied to the skin of our patients does cause irritation, because the body is covered with hair, and in each hair follicle there is a nerve, but on the human skin turpentine has no irritating effect unless applied along with hot cloths or some other agent.

The word turpentine naturally conveys to the mind a state of irritation if spoken of as applied to a raw wound or sore. This is wholly imaginary fear of irritation. I can with certainty, and from personal experience, tell you that turpentine applied to a wound or raw surface has a most soothing effect.

I have read many books on Materia Medica, even to Lauder Brunton's *Physiological Materia Medica*, and with the same result, no more information further than turpentine is a diuretic, causes irritation when in certain ways applied to the skin.

Turpentine is frequently given with oil to allay tympanitis and prevent further decomposition both in horses and cattle. Even the ordinary farmer has learned this.

That turpentine is very volatile there is no gainsaying, and is forced upon the ordinary observer by the following fact, viz.: say, take 2 ounces

[1] *Op. cit.*, p. 79.

[2] Read at a Meeting of the Scottish Metropolitan Veterinary Medical Society, February 1902.

of turpentine, and pour it three or four times into different vessels, and it will be found that the person that has so handled the turpentine, his urine when voided say fifteen minutes after the operation will smell strongly of turpentine, or rather sweet violets, due to the inhalation of the turpentine.

Again, if a cow in milk be given a dose of turpentine, the turpentine will be tasted in the milk at the next milking, although the time be short between the giving of the turpentine and the milking.

These facts clearly show that turpentine is very volatile, and that when administered directly, or by inhalation, pervades the whole system, and this is a reason why I consider turpentine one of the best antiseptics. The reason why I say one of the best antiseptics is because so many medicines act only locally, but turpentine acts both locally and generally.

Some medicines are termed antiseptics and some others germicides.

What is an antiseptic? Klein seems to describe an antiseptic as an agent which destroys putrifactive bacilli, one of them being the bacillus of septicæmia; but in order to pronounce a certain substance a germicide Klein says again: "In the strict sense of the word it is necessary to place the organisms in this substance for a definite time, then to remove them thence, and to place them in a suitable nourishing medicine; if they then refuse to grow, the conclusion is justified that the exposure has injured or destroyed the life of the organisms."

Klein again goes on to say—and he takes his standard bacillus, the bacillus of anthrax—that there is no true germicide but extreme heat.

What have we to do with anthrax in the way of treatment? We never get a chance to treat; death is so rapid; neither are we allowed to make a post-mortem of animals dead of anthrax, and therefore have no chance to experiment with the bacilli.

I merely mention these facts to show that the bacilli of septicæmia can be destroyed in the living animal, and I feel certain from practical experience that turpentine is the best agent that can be used.

To illustrate this, I take a case of difficult parturition in a heifer, where the tissues are more or less bruised and lacerated, and where part of the broken placenta is retained in the uterus, and in which case antiseptics are called for.

Again, take a byre where septicæmia has been generated by the accumulation of filth, such as decomposing placentæ or other animal matter, especially where there is a thatched roof, the bacilli septicæmia are constantly floating about ready to seize upon a fitting media.

A new-calved cow, with all the generative organs in an open state, the natural discharges, and a natural animal temperature, is a very fitting medium for the growth and multiplication of these organisms.

Again, we have what is called "inflammation" in ewes at lambing time, but which is nothing more nor less than septicæmia, due to the use of permanent lambing sheds, where there are always plenty of decomposing placentæ and lamb skins, and the shepherds' hands conveying the disease from the diseased to the healthy animal.

There are many other diseases of the same nature that I could allude to which call for the use of a good antiseptic.

Carbolic oil has been greatly used for the cases I have just mentioned, but I find carbolic oil causes straining, and consequently irritation.

I may state that I have given this class of disease special study, and I have had ample opportunity for so doing. For a long time I was puzzled

to find an antiseptic fitted to combat diseases of a septic nature such as I have mentioned.

Partly by accident or luck, whichever it may be termed, and which I need not relate, I found that turpentine had a most wonderful effect. I found that turpentine used *in utero* was stimulating, healing, and a splendid antiseptic, and that it pervaded the whole system.

In cases where straining was great I added a little chloroform, and ultimately I found a mixture, and which I use in all cases, viz., turpentine, chloroform, and oil, as the best.

Gentlemen, in the cases I have mentioned I find turpentine a most unfailing remedy.

I wish some energetic bacteriologist would try the effects of turpentine on germs, the *Bacillus anthracis* excluded, and I feel certain it would give the most pleasing result as a germicide.

ON METHODS AND FORMS OF PROFESSIONAL ADVERTISING.

BY E. WALLIS HOARE, F.R.C.V.S., CORK.

WHY is advertising carried on? The answer is, that in order to secure a start in business of any kind, or to increase a business already started, or to successfully cope with competition in prices, it is necessary to draw the attention of the public to the fact that we can offer as good terms to them as our competitors in the same line of business. Old-established houses do not advertise to the same extent as those commencing, nevertheless they have to keep their names before the public eye lest they sink to oblivion or get out of date. It has always been a recognised rule that men in certain professions should not advertise their skill or laud their attainments. Medical men, barristers, solicitors, and clergymen come under this heading. With dentists it seems to be optional, as we see plenty of advertisements in the public press from them, but those having good practices and a high reputation do not advertise or distribute circulars. In the veterinary profession, until the bye-law was passed, advertising was very common. No doubt we hear some boast that they never advertised; the reason for this is probably that they had no need to do so; they stepped into a practice ready made. But the majority who had to commence at the lowest rung of the ladder of fame have advertised in more or less degree.

There is a difference of opinion as to the justice or otherwise of the present bye-law against advertising. As there are two sides to every question, we must consider both in order to arrive at correct conclusions. In the first place, no one doubts but that, in order to place the veterinary profession on a similar basis to other professions, it must follow the recognised rules on this subject. The established practitioner has no need to advertise in the press, or to issue circulars publishing his superior attainments. It is the young practitioner that the bye-law will materially affect Let us inquire how the veterinary surgeon about to start to earn his living is to obtain any practice. Certainly he will not attain his object if he "sits like Patience on a monument smiling at grief." He must get cases somehow, if he is to live and pay ordinary expenses. Experience teaches us that newspaper advertising is of very little value in obtaining clients. It

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simply informs the public that a certain individual is looking for work. If this individual exceeds the insertion of the ordinary card, and puffs his abilities or announces cheap fees, clients that are any good will read his advertisement with a credulous smile. Of course, cheap fees and advertisements savouring of the quack will appeal to a certain section of the community; but these he will find of little or no value. Circulars, in this country at least, are of no value. They simply find their way into the waste-paper basket.

"Seeking the bubble reputation" is a difficult and arduous task in any calling, but more especially in the veterinary profession, where opportunities are limited. Are we then to infer that in professions in which advertising is prohibited there are no means of obtaining practice? Certainly there are, some of which are honourable, some the opposite. Friendship and relations prove very valuable in securing clients, although it has been said that "a prophet is without honour in his own country." If in a strange district, the young practitioner must set about to make his friends,—not always an easy task to accomplish. As a rule, he will have friends enough who will not pay him for services rendered. An influential resident's patronage is of more value than any amount of advertising. The difficulty lies in getting this patronage. Certainly advertising will not secure it. Of course the element of chance enters into the building up of a practice. If an apparently hopeless case happens to come right under the practitioner's care, it is a feather in his cap. Again, tact, a good manner, a knowledge of the ways of men and things, care and attention to patients, and civility, are very important adjuncts to success. The junior must not forget, however, that self-confidence, without wavering in opinion, is of vital importance in attaining a reputation. However we may condemn dogmatism as a bar to the advancement of knowledge, a judicious blending of it is useful in practice. We must inspire our clients with confidence in our ability. Qualifications, scientific knowledge, and a distinguished college course do not receive much consideration from our employers.

We must admit that experience teaches one important fact, viz., that those who are most successful in the veterinary profession from a commercial point of view are not those whose scientific attainments are the highest, or those who are enthusiasts. A man starting in a district with little or no opposition is very differently situated from one who commences in a city in the teeth of keen competition. The former has only to make some friends, who will introduce him to others, and, as a rule, is able to pay his way. The latter has a very uphill course, and has to play a waiting game if he desires to succeed. Let him not imagine that he will be received by his *confréres* already established with open arms. Such sentiments are often preached, but very seldom practised. He may start prepared with the fact staring him in the face that his *confréres* will be the last from whom he may expect assistance in the conquest after clients. They may "damn with faint praise," but they are pretty certain to place every obstacle in the way of allowing clients to leave them. Philanthropy is a rare commodity in affairs of this kind. From those who have laid by the nest egg we hear from time to time discourses on etiquette and professional conduct, and instructions to the juniors as to what they should and should not do. Certain ways and means of obtaining practice are condemned, and one would imagine that veterinary surgeons could exist on air and professional dignity. Gratuities to grooms and coachmen are

spoken of with pious horror, and the influence of the forge is stated to be a bar to professional progress. Still, if such were honest, they would admit that in their early days a large amount of their success depended on what they now condemn to their juniors.

Some condemn all forms of advertising, and still do not hesitate to permit a paragraph in a sporting paper describing some of their feats in surgery, or of their having examined a valuable horse for a celebrity. Nor do they think it unprofessional to criticise the treatment of a case by another practitioner behind his back. On such a subject well might we say with the poet, "Oh for a forty-parson power to chant thy praises, Hypocrisy."

We hear a lot with reference to the taking of a client from another practitioner, but if we refuse every newcomer because he is another man's client, what are we to exist on? Certainly, if we obtain such a client by dishonourable means, it is unprofessional conduct, but as there is no such thing as a monopoly in practice, every client is free to go where he likes.

It should be clearly understood that while advertising is to be condemned, there are far worse sins against professional etiquette. Of all the means of obtaining practice, advertising in public is the least useful. We may as well be honest in the matter, and admit that a practitioner cannot show his ability without getting a chance of doing so, and the recommendations of friends are the most important in this respect. He must at the same time take care to have the attendants of horses in his favour: how he is to accomplish this in an honourable manner he will learn by experience. Let him not permit any of his friends, no matter how good their intentions may be, to get him a client from another practitioner by dishonourable means. He will find from time to time, that no matter how strict a code of professional rules he may endeavour to carry out, his *confréres* will not adhere to them. This, however, should not lead him to retaliate, as all are human and liable to err; besides every one does not regard professional etiquette in the same light, while the instincts of all tend to desire a larger *clientéle*.

Taking everything into consideration, we are forced to the conclusion that the suppression of advertising is of great advantage to the veterinary profession. It is useless to argue that worse evils exist, because even if advertising were permitted, the dishonourable practices complained of would still be in existence. So long as competition is as keen as at present, "touting" for clients will continue, and a practitioner who goes into a district already fully equipped with veterinary surgeons cannot expect that clients will flock to him, or that his *confréres* will receive him with open arms. It is when the supply exceeds the demand that advertising and dishonourable practices are carried on. Introductions to clients are gained in other ways more profitable than advertising. Thus a veterinary surgeon who hunts, as a rule, gets the pick of paying clients in a district, and the pastime greatly enhances his reputation. Wounds in the hunting-field are grist to his mill, and he often succeeds in getting some clients from a practitioner who does not hunt.

The forge in many instances brings practice, especially at the start; the responsibilities and want of profit in the business, however, after a time make us wish to get rid of this appendage, and we have more satisfaction in treating our clients' horses when they are shod elsewhere. A good social standing is said to get some men into practice. At any rate, if we are to

judge by the frequent yearnings for society, it must be some value. We have known, however, instances in which it was of no value, as the autocrat of the drawing-room proved himself to be of no value in the stable. It is such individuals who are always prating about the importance of professional dignity, and the low social status of the calling.

DIRTY DAIRIES AT NOTTINGHAM.

Dr. W. B. Ransom, M.A., F.R.C.P., Physician to the General Hospital, Nottingham, in a paper entitled "Should Milk be boiled?" in referring to the sources of contamination of milk, says:—The slightest acquaintance with the methods of the farmer, the dairyman, and the milkman shows that pure milk is an unknown substance on our tables. Secreted perchance in a healthy mammary gland, the fluid is drawn through unwashed rustic hands into a pail placed under the dung-spattered udder and belly of a cow who spends at least half her time in a dark and noisome byre, carpeted with a slush of decomposing urine and fæces, and papered with the splashings of the same, while the air is thick with the bacterial flora of these admirable culture media and of the bovine alimentary canal. What wonder that the bottom of a milk-can nearly always exhibits a rich sludge, and thus serves the purpose of a cesspool or septic tank? It has been calculated that the inhabitants of Berlin consume in their milk 3 cwt. of excrement per diem. Even in the milk of one of the most model dairies of this district, where hand-washing and teat-washing are supposed to be *de rigueur*, have I seen this sludge, which the milkman said he could not understand, because he always strained the milk through a cloth before sending it out! And on arrival in the city do we not daily see a row of milk-carts in the bright and perfumed air of Station Street, where milk is being poured from big cans into smaller ones, through dirty cloths which between their services lie about anywhere?

When in addition to the chances of pollution we recall the contaminated water with which in country places the milk-cans are often washed, the contaminated atmospheres of shops and cellars in which the milk retailed to the poor is usually stored, we no longer wonder that milk, even from a healthy cow, occasionally makes people ill.

But in the present state of the law we have no guarantee that our milk does come from a healthy cow, and in most English towns milk is sold coming direct from udders which are affected by tuberculous or other inflammatory disease, and from which in milking a considerable quantity of pus is squeezed into the milk-can.

PATHOGENIC PROPERTIES OF CONTAMINATED MILK.

Thus, as matters now stand, we are liable to drink milk which may come from a diseased cow and which is almost invariably exposed to contamination by subsequent dirt. The milk on which our children mainly live may be primarily or secondarily a pathogenic fluid. Thus epidemics of scarlet fever and diphtheria have been traced to the milk from diseased cows, while the virus of these diseases and of typhoid fever has been introduced by infection from the *personnel* of the dairy or milk-seller. Tuberculosis I will not dwell on, though I think that cases of milk infection in

that disease have been made out. But undoubtedly the main disease caused by milk is the summer diarrhœa or gastro-enteritis of hand-fed infants, the mortality from which is appalling. Thus the deaths in Nottingham among children under one year of age were in 1900 equal to 196 per 1000 born, and in 1899 to 210 per 1000, and the total of deaths from diarrhœa in 1899 being 600.

THE TUBERCULIN TEST OF IMPORTED CATTLE.[1]

THE regulations of the United States Department of Agriculture require that "All cattle over six months old imported into the United States after March 1, 1900, which are subject to quarantine, and except as otherwise provided, shall be tested with tuberculin."

At the present time the people of nearly every stock-raising country are alarmed over the prevalence of tuberculosis among their cattle. The disease is recognised as the most widespread, most insidious, and most disastrous of any of the diseases affecting cattle. It is a strictly contagious disease which may spread to nearly every animal in a herd, and not to cattle only, but to swine and most other species of animals. The weight of medical authority favours the conclusion that it may be communicated from animals to man with fatal results.

"Several years ago the writer of this communication received a letter from a good citizen in the State of Iowa asking him to name some breeder of good cattle of a certain breed from whom the inquirer might purchase some choice stock. As a result, this Iowa party came to Wisconsin and purchased seven head of pure-bred stock, paying good prices for them. In taking that stock back to Iowa he carried back tuberculosis in the most virulent form it ever affected a herd in this State. He lost all of the seven animals through death by tuberculosis, and contaminated his whole herd, so that he was forced to sacrifice all of the dairy animals he had. And this is but one of more than a dozen places where tuberculosis was spread by sales from a single herd of pure-bred cattle."—(Hoard's *Dairyman*, Dec. 28, 1900.)

Is there any possible argument which can be advanced to show that it is in the interests of farmers and stock-raisers generally to perpetuate the existence of this terrible disease among our breeding herds, and, much less, to favour the introduction of still more contagion from abroad? Not only is it against the farmers' interests to have the disease favoured and propagated and spread, but it is also against the interest of the breeder of pure-bred stock.

The farmers and dairymen who have suffered from tuberculosis in their herds have not yet fully realised that they have generally introduced the disease by the purchase of pure-bred stock. Only a few weeks ago great excitement was caused in Vermont by the slaughter of several large dairy herds in which a very large proportion of the animals were found tuberculous. Some writers for the press exclaimed in effect: "These are our most valuable and highly bred herds; if they are tuberculous to such an extent, what must be the condition of the remainder of our cattle?" They did not grasp the idea that these particular herds had probably been con-

[1] Abstracts from a Report by Dr. Salmon, Chief of Bureau of Animal Industry, U.S.A.

taminated in the very effort to improve them by using pure-bred breeding stock. But others who have traced the origin of such outbreaks and disasters will soon make the fact apparent to every sufferer, and then there may be such fear of pure-bred stock that the market will be injured and the cattle industry retarded for many years in its development. The enterprising breeders of pure-bred stock in the United States should take active steps at once to guard against such a result. They should not, by any neglect on their part, allow a prejudice to form in the public mind which would be detrimental to the live stock interests of the country. There is nothing that promises more benefit to American agriculture than the rapid grading up of our herds by the use of pure-bred stock of the improved breeds, providing this stock is free from disease; but, on the other hand, if this stock is permitted by the breeders to become tuberculous, if the pure-bred herds are the centres from which the contagion is constantly spread over the country, there is nothing which can do more harm. Our herds are probably in better condition to-day than those of any other country. Is it not important that they should be kept in this superior condition, and that the small proportion with disease should be cleaned up and not allowed to continue a menace to a great industry?

The danger from tuberculosis is not confined to the dairy and farming regions of the country. It menaces the cattle on the ranges of the Great Plains and Rocky Mountain region as well. Heretofore it has been generally believed that the ravages of this disease were confined to cattle that pass at least a portion of the year in stables. This conclusion is now disproved by the spread of tuberculosis in Argentina, Australia, and New Zealand, where the cattle pass their entire lives in the open air, and where the climate is very favourable to the cure of tuberculosis in man, as is particularly the case in parts of Australia. If the cattle in the countries mentioned are subject to this disease, how can we expect our range cattle to retain their comparative exemption from its attacks if we continue to turn among them a constant stream of tuberculous breeding stock?

The Dairy Instructor of Queensland, Australia, said in the Annual Report of the Department of Agriculture of that Colony for 1897-98 :—

"This disease is gaining ground very rapidly, and from tests and personal observations I am quite satisfied that 20 per cent. of the dairy herds in Queensland are more or less affected with tuberculosis. . . The question may be asked why this disease was not prevalent years ago. The answer is that the disease is spreading more rapidly every year, and for every one beast that is affected this year five times the number will contract the disease next year, and so the disease will continue to spread unless stringent measures are adopted to check it."

ABSTRACT FROM A SPECIAL ARTICLE ON CLINICAL PATHOLOGY.

BY STUART M'DONALD, M.B., M.R.C.P.ED., ASSISTANT PATHOLOGIST TO THE ROYAL INFIRMARY, EDINBURGH.

THERE are two classes of medical men who not infrequently invoke the aid of the pathologist in the diagnosis of disease. We have a small but worthy group who have unlimited faith in the power of the pathologist to diagnose

any given condition with the aid of the microscope; and we have a second and larger class who make no endeavour to conceal their doubts as to the ability of the pathologist to render any material aid in the diagnosis of disease. The first class often demand impossibilities; the members of the second group are at times a trifle irritating. It is not to be suggested for a moment that there is not a third and larger class who can steer a happy middle course and make use of the pathologist's report without being guided entirely by it.

MORBID HISTOLOGY.

We may take as an example the not infrequent request from the clinician for a diagnosis between a simple and a malignant new growth. In the first place, the pathologist has not infrequently to complain of the state in which he receives the specimen for examination. Nor is this altogether to be wondered at, for if one turns for information to a text-book he becomes bewildered at the multiplicity of methods for the correct fixation and preservation of tissues for microscopical examination. As a matter of fact the best results are to be obtained by a variety of methods, according to the particular point to be investigated. In spite of the considerable shrinkage of the tissues by alcohol, it is apparent that the advantages of ordinary methylated spirits as a fixative and hardening agent for ordinary, as apart from nervous, tissues are not sufficiently recognised. Tissue so fixed cuts easily and stains well. Spirit, too, has a distinct advantage where a bacteriological examination of the tissue is also required. Formalin in ten per cent. solution is an excellent general tissue fixative, but bacteria in such fixed tissue sometimes require special methods for their demonstration. The modern tendency to put all pathological specimens into strong solutions of formalin is to be strongly deprecated, it being difficult after a time to obtain satisfactory sections of the, so to speak, petrified material. I heard some time ago of a surgeon who, having removed a small piece of a suspicious tumour for microscopical examination, unfortunately left the specimen in his coat pocket for some days. In spite of this, however, the pathologist who examined the specimen was able to report that the tumour was undoubtedly sarcomatous, and that the cells, though sat on for some time, were still round.

Small pieces of tissue for microscopical examination sent from a distance should be wrapped in a little cotton wool so as to minimise shaking in the bottle.

The specimen in all cases should be accompanied by a brief history of the case and a statement of the special points to be investigated. Too often this is entirely forgotten. I am told that in many of the German laboratories specimens sent without such information are immediately consigned to what is the equivalent of the waste-paper basket in a pathological laboratory. Every one is aware of the extreme difficulty of distinguishing between inflammatory and sarcomatous tissue, but the clinical history, with a statement as to the site of the lesion, sometimes enables one to give a definite opinion where the microscopical appearances alone would not justify this.

The surgeon should remember also that where he has a choice he should send for examination more than one piece of the tissue, as the appearances vary so much in different parts of, say, a tumour.

A word must be said as to the examination of the blood. The com-

plete examination of the blood has now become an operation of considerable complexity, and the interpretation of stained films requires special training and considerable experience. It is probably too much to expect this of the (ordinary) student or practitioner, but at least every one should know how to make a blood film properly. Even this requires considerable experience, but a method such as the following is sufficient for ordinary purposes of diagnosis :—Clean an ordinary 3″ × 1″ glass slide thoroughly with soap and water; finish the cleansing with alcohol or spirit, and dry. Clean the lobe of the ear with soap and water, and dry. Prick the lobe with an ordinary straight surgical needle. Transfer a small drop to one end of the slide. Touch this with a piece of gutta-percha tissue or cigarette paper; the blood spreads out in a thin film between the tissue or paper and the glass. Now draw the tissue or paper along the slide; a broad thin smear is left. This is allowed to dry in the air. The edge of another slide may be used instead of the gutta-percha or paper. It is said that some leucocytes may adhere to the paper, &c., but enough will be left on which to base a diagnosis should anything specially abnormal be present. This method is much easier than the cover-glass method for those who have little or no experience in making blood-films. If the practitioner would make such preparations oftener from some of his doubtful cases, and transmit them to the pathologist, he might gain much useful information, and possibly it might be found that conditions such as leucocythemia are commoner than is generally supposed.

No special instructions should be necessary for the medical man in sending pus or fluid for bacteriological examination. Such material should be collected with the most rigid aseptic as opposed to antiseptic precautions, in the sterile test tubes or capillary tubes; these should be plugged with sterile wool, or hermetically sealed and transmitted to the laboratory at the earliest possible moment, with a brief history of the case, and a definite statement of the particular point to be investigated.—(*The Scottish Medical and Surgical Journal.*)

PINK-EYE.[1]

BY S. WHARAM, M.R.C.V.S., LEEDS.

THE name "Pink-eye" is not an old one, as I have failed to find it in any of the old farriers' books. Its origin is obscure; some say it is from America, but in any case it is the result of a symptom of the disease, viz., the conjunctivæ are a pink colour and in the majority of cases easily seen without manipulation. Other names have been suggested—epizootic cellulitis, &c.—but none of them seem to me to be as good as the common one; they neither throw light on the cause, nor do they explain the nature of the disease.

Pink-eye I believe is a contagious fever, a form of influenza, and caused by a specific micro-organism not yet satisfactorily demonstrated. There are other predisposing causes and conditions which are favourable to the spread of the disease, of which the most important are the following: A low temperature, accompanied by wet, foggy, and damp atmosphere, insanitary

[1] Read at the Annual Meeting of the Lincolnshire Veterinary Medical Association on 13th February 1902.

stabling and surroundings, inferior and insufficient food, injudicious clipping and want of clothing, exhaustion by work, in short anything that will tend to reduce the bodily tone and render the animal more liable to be attacked by the specific organism.

SYMPTOMS.

The primary symptoms are rigors, rise of temperature, accelerated pulse, 50, 60, or 100, and dullness; but the animal is usually first noticed to be picking listlessly amongst its food, having lost its appetite. The swelling of the eyelids and discharge of lachrymal fluid quickly follows, the eyes not always being equally affected, and is often succeeded by pain in the legs and considerable enlargement, usually most marked at the joints. The temperature rises to about 104, 105, and sometimes 107, or even higher, and should in all cases be recorded where there is any suspicion of the disease prevailing. In this disease it is most important to discontinue work immediately there are any signs of it commencing, as work after the commencement often results in serious complications. In ordinary cases, under favourable circumstances, the disease runs its course in about a week, and seldom causes death if not complicated. There is often some swelling about the throat, with cough, difficulty in swallowing, and considerable nasal discharge. The virus does not always affect the nasal mucous membrane, and sometimes this nasal discharge is absent.

The most serious complications are those affecting the respiratory organs —pneumonia, pleurisy, diarrhœa, and sometimes griping pains result from irritation of the alimentary tract, but these as a rule yield to simple remedies, and each complication requires careful treatment as it arises.

I have noticed that different outbreaks of pink-eye and influenza have assumed different forms in each year, and the complications have varied in a similar manner. The virus in some instances affects the heart and blood-vessels, the heart is weakened, its beats are wanting in force, with the result that the peripheral vessels become congested, and the extremities and pendulous parts swelled.

PREVENTION.

I have seen it stated that no amount of care would prevent an attack of pink-eye, but I believe that all contagious diseases can in some measure be prevented. I advocate, in addition to good general management as regards feeding and stabling, &c., washing out the mangers with Jeyes' or similar disinfecting fluid and hot water every day, fumigating all the stables with vaporised carbolic acid twice daily, and supplying each stableman with a bucket of disinfecting fluid and water every day for general purposes. If the precautions are carried out every day in all large studs of horses stabled in towns, or crowded together for working purposes in any building, pink-eye will be practically unknown.

If an animal is noticed amiss it must be immediately isolated, and the temperature taken of all other horses in the same stable. In addition to preventing the spread of pink-eye, such preventive measures promote the general health of the stud. The carbolic vaporising is done by a patent and inexpensive vaporiser and acid supplied by Calverts, of Manchester, and the other disinfectants can be supplied in bulk at about 3s. per gallon by firms such as Jeyes, Tunstall and Co., of Leeds, and Newton Chambers and Co., of Sheffield. The use of these things has also the advantage of

greatly reducing the number of flies, which alone in hot weather is worth the trouble and cost, as it relieves the horses from a great amount of irritation.

During three of the most severe outbreaks of pink-eye that visited the city of Leeds, several studs of horses where this system was carried out all the year round were not affected excepting in solitary cases, which were at once isolated, aud the working strength of the stud was not curtailed; whereas other studs, where no precautions were taken, had numbers of horses affected and the working strength of the stud considerably reduced, and in studs where these preventive measures were commenced after the first few cases were noticed and immediately isolated, the spread of the disease was at once checked and the recovery in the animals affected later was more rapid. In the studs I first mentioned not a single animal was lost.

I believe the organism or germ of pink-eye cannot exist long outside the animal body. The period of incubation is short, probably about two or three days, and the disease is extremely rapid, but its virulence is greatly increased by insanitary surroundings. I am inclined to favour the idea of a period of immunity existing after an attack, but cannot say how long that immunity may last.

POST-MORTEM APPEARANCES.

These vary considerably, but, generally speaking, you find—*Lungs* congested and œdematous with catarrhal inflammation of bronchial tubes. *Heart* contains dark clotted blood, is soft and discoloured. *Stomach and intestines*—Catarrh of mucous membranes sometimes accompanied by necrosed areas. *Connective tissue* contains fluid and inflammatory exudate in most parts of the body, particularly the limbs.

TREATMENT.

As I have mentioned before, pink-eye should be recognised as a contagious disease, and all animals attacked by it should be isolated under good hygienic conditions and allowed plenty of fresh air; they should have sufficient clothing and complete rest. The food should be given in small quantities and often, and consist of crushed oats, chop, hay, carrots, and a little bran; I do not believe in mashes. A small quantity of boiled linseed added to oats or bran and chop is palatable, but the usual mash is often found untouched in the manger, and if horses do eat a quantity of mash they are not so readily brought into condition for work again as those fed on corn, &c. In treating a number of horses give a small portion of their ordinary food, damped occasionally, a few carrots, with the addition of linseed or flour gruel as the case indicates. Cold water to drink with medicine in it as directed.

The stables sometimes require heating, as the animals do not move about, and in cold foggy weather soon become chilled. The heating can be done by a coke fire-pan brought into the stable after having been burnt to a red heat outside. It soon alters the temperature inside the building in which it is placed, and in addition gives off sulphurous acid gas (which is a powerful antiseptic deodoriser) but not in such quantities as to cause irritation to the animals. A fire-pan can be easily devised by making holes with a pick-axe in the side and bottom of a metal bucket; this

placed on bricks or stones makes a good substitute when the proper article is not at hand.

Bedding should be kept free from excrement, and disinfected every day. I have a bucket of disinfectant at the door of each stable, and the contents sprinkled about the bedding and fresh made for outside every morning. Sawdust bedding is clean, good, and the most sanitary. I have no objection to any other kind, but if the stable has inside drains strong carbolic acid and boiling water should be put down them occasionally. Any kind of bedding can be disinfected by using a fine rose water-can and a suitable fluid disinfectant.

The medicinal agents most suitable are Mag. Sulph. ℥j. and Pot. Nit. ℥j., Liq. Amm. Acet. Conc. ℥j., and Aconit. 5mm. given alternately in the drinking water four or five times a day. I do not believe in the animals having cold water *ad lib.*—they are at first very thirsty, and take the medicines in water without trouble, the thirst diminishes sooner if the water is given judiciously with the medicines named, and the animal makes a better recovery than if allowed an inordinate quantity of water.

Slight variations should be treated as follows:—For costiveness or diarrhœa regulate the diet, giving linseed, bran, treacle, or flour gruel, dry food and dried malt extract, as the case indicates.

Soreness of the throat and cough, Pot. nit. and Pot. chlor. aa. ℥ii. mixed with treacle and placed on the tongue as an electuary two or three times daily.

If the legs fill below the knees and hocks they are best left alone; there is, generally speaking, no danger after the swelling has subsided.

For symptoms of heart failure stimulants are necessary, and a draught of Spt. æth. nitrosi ℥ij. or any cardiac stimulant is indicated, such as brandy, whisky, or gin, but I do not recommend giving draughts unless absolutely necessary, the condition of the animal is such that the exhaustion of continual drenching does more harm than the medicine does good, and very often lung and other complications are set up by the carelessness in forcing medicine or liquids of any kind.

Where congestion of the lungs and difficulty of breathing is present, mustard applied to the throat or sides gives almost immediate relief. Not only is the congestion and breathing relieved, but the temperature is lowered, and in a few hours the animal commences to feed and look brighter. I cannot understand how some people have failed to see the great benefits resulting from the application of mustard in these cases. Hot fomentations might be better, but they are out of the question where you require rapid action and have very few hands, and perhaps only one set of fomenting pads and several horses requiring attention in the same manner. I have taken the trouble to practically test the application of mustard in lung complaints, and I am satisfied it is as successful as many remedies in the medicine that have been named specifics, but it must be applied in time.

For great prostration beef tea and bovril are useful, but these cases are the exception; slings are sometimes required if the animal gets down and has difficulty in rising. Tr. nux vom. in the drinking water twice daily assists convalescence, or mixed with Tr. ferri perchlor. as a draught in beer.

Following superpurgation in fat horses, laminitis not unusually follows. Roaring, purpura, hæmorrhagica, and a few local affections are the most serious sequels.

XUM

Mr. H. C. REEKS remarked that the man who rose to open a discussion was prone to imagine his duty to be a somewhat painful one, and to think his time should be given over to a vigorous "slating" of the paper he had just heard. In this particular instance, however, he was spared the unpleasantness of performing so thankless a task; for the manner in which Mr. Wharam had dealt with his subject had certainly left no room for a serious attack. If fault could be found at all it was because the paper was far too short, and Mr. Wharam's faults were those of omission rather than of commission. They would all have been pleased with more of the paper on similar lines. The name of pink-eye was a peculiar one, and he thought it was a pity that it had crept into the veterinary nomenclature. He much preferred the name of influenza; for if not actually the same disorder, it so nearly resembled the human complaint of that name, both in its symptoms, onset, and after effects, as to merit the same title. There were many of their clients who did not know what pink-eye was, and when mention of it had occurred in the local papers he had often been asked to explain its real nature. These clients would have known it better under its more correct title of influenza. Mr. Reeks thought that the essayist should have mentioned and laid stress on the importance of differentiating between influenza or pink-eye, contagious equine pneumonia, and a common cold, or coryza. This was well known as a very infective disease, and although disinfectant preventive measures should be advised, a prompt and strict system of isolation when once the disease has broken out would do more to check its spread than the most elaborate preliminary precautions. Mr. Wharam had said he believed that the organism or germ of pink-eye could not long exist *outside* the animal body. This was another of his sins of omission. He had neglected to point out the highly important fact that this germ could live for a very long time *inside* of it. Mr. Reeks then related at length the details of a case in which he had seen the disease spread right and left by a stallion that was at the time of service apparently healthy, and as far as could be ascertained had never suffered even from a previous mild attack. The case was fully described in *The Journal of Comparative Pathology and Therapeutics* in June 1901. The vital points of the history of the outbreak were—

(1) In each case the disease commenced with a mare covered by the stallion.
(2) Symptoms of influenza on the eighth or ninth day.
(3) It then spread to other horses in the same stable.
(4) To his (Mr. Reeks') knowledge, there had not been an outbreak of pink-eye in the district for at least ten years previously.
(5) The mares at the time of serving were healthy, and not suffering from colds.
(6) The disease commenced only on the premises where service had taken place, and nowhere else.

Pink-eye was a disease that seemed to come upon us now and again. For several years a locality would remain free, and then with a fresh outbreak numerous cases would crop up over a wide area in the course of a few days. With regard to his manner of treatment, he agreed with Mr. Wharam in avoiding drenches. What medicine he did endeavour to give he gave in the form of balls or in the food or drinking water.

The PRESIDENT remarked that personally he had never seen a case,

but there was no doubt that it was a form of influenza, and the treatment must follow on the same lines. The greatest difficulty must be during the period of incubation. It appeared that the germs might be in the animals for weeks, if not months, unnoticed, and then break out. He thought it would be a good plan if they found a case to take the temperature, for the first symptoms of the disease was a rising temperature, and then it could be taken again in twenty or thirty hours. The animal must be isolated, but he had never seen fumigation. He should certainly give bran mashes, for he considered they would lower the temperature, and he had always associated the giving of corn with a high temperature, which he did not consider advisable in pink-eye; and drugs only in such quantities as to kill germs.

Mr. SMITH thought it was advisable to give an animal with a high temperature, as was the case in pink-eye, a bran mash with a few steamed oats. He had also found very good results from the use of bandages. Some horses had the disease in a much milder form than others, the more serious cases sometimes developing into pneumonia and pleurisy. It was not advisable to give many drugs, particularly if the heart was bad.

THE LYMPHATIC SYSTEM OF BOVINES.[1]

BY ALFRED HOLBURN, M.R.C.V.S., CHIEF VETERINARY INSPECTOR, CORPORATION OF MANCHESTER.

MR. HOLBURN said: The lymphatic system includes the lymphatic and lacteal vessels of the glands through which their contents pass. The lymphatic vessels may be said to be found in all the textures and organs which receive blood. It is, however, with the connective tissue of the several textures and organs that they are most intimately associated. Two modes of origin are described, viz., 1, the plexiform; 2, the lacunar. The term plexiform is applied when the lymphatic capillaries commence in the form of a network, and lacunar when the capillaries arise out of the connective tissue or lacunar spaces like so many tubes fed from a reservoir. The latter method of origin is described as the most common, and the lacunar spaces are thus accounted for. The fluid part of the blood is being constantly filtered through the walls of the blood capillaries. The liquid is poured into the numerous lymph spaces which abundantly traverse the majority of the tissues in such quantities as to bathe the tissues, and to supply sufficient nourishment for their support, after which it is removed by the lymphatics, so that in health no accumulation takes place. Therefore these vessels are a means of collecting the exuded blood-plasma and returning that part which is not absorbed by the tissues into the blood-stream again. The lymph capillaries and vessels freely anastomose with one another and are much more numerous than the veins. The lymphatic vessels of the intestinal canal are called lacteals, because of the milky appearance of the fluid contained within them during digestion. Their mode of origin is said to slightly differ from those just mentioned (in blind dilated extremities) within the intestinal villi, otherwise they resemble the other lymphatics.

[1] Read at the Annual Meeting of the Yorkshire Veterinary Medical Society, 31st January 1902.

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Lymph under ordinary circumstances is a clear yellowish coloured fluid of an alkaline reaction, and in most works on physiology is regarded as diluted blood-plasma—that is to say, it contains all the constituents of liquor sanguinis, but in proportionally different quantity, the difference chiefly being that there is less albumen and relatively more water. This view is no doubt based upon (*a*) chemical analysis, and (*b*) the physiological function, viz., that of the transudation of the fluid part of the blood from the small arteries and capillaries into the plasma spaces or connective tissue spaces of the body, which, after the tissues have taken up their requirements, is carried away by the lymphatics bearing the character of weak or watered blood-plasma. The observations made by some recent investigators upon the lymph formation in large animals point to a somewhat different conclusion. The results of their experiments go to show that lymph is not a simple product of transudation from blood-plasma under the influence of blood pressure, but that is a product of the elaboration of the tissues, and that its formation is in direct correspondence with the vital activity of the tissues. This much, however, may be said, that whatever functional activity is responsible for the formation of lymph, there are two things with regard to the composition that have been firmly established: 1. That it contains excrementitious matters thrown off in the metabolism of the tissues: 2. That changes in the character of lymph correspond very closely with changes in the character of the blood. Chyle consists merely of lymph to which are added some of the absorbed products of digestion. These are chiefly particles of fatty matter or minute oil globules, and, like the fatty globules suspended in milk, they give the chyle a milky appearance. These fatty particles constitute what is termed the molecular base of the chyle.

The lymphatic glands, formerly called conglobate glands, and termed by modern French writers lymphatic ganglions, are solid, more or less rounded or elongated bodies situated on the course of the lymphatic and lacteal vessels which are found alongside the principal blood-vessels of the body. In size they may be described in cattle as being voluminous, their dimensions varying from a grain of wheat to 4 or 5 inches in length (some of the mesenterics). They are of a greyish appearance and generally present on one side a slight depression—the hilum—through which the blood-vessels enter and leave their interior. The efferent lymphatic vessels also leave at this point, while the lymphatic vessels that supply the glands—afferent vessels—enter the organs at different parts of the periphery. On section of one of the large lymphatic glands two different structures can be made out, viz., an outer or cortical portion, and an inner or medullary portion. The cortical portion occupies all the superficial parts of the gland, except at the hilum. The medullary portion occupies the centre and extends to the surface at the hilum. In the cortex the structure is most marked. The glandular tissue within the trabeculæ occurs as a tolerably firm pulp giving rise to small rounded bodies or masses, which are known as the cortical nodules or follicles. These little bodies are more easily made out when the glands are swollen. Many of the glands in the adult animal have always a mottled appearance, due to the deposition within their structure of black pigment. This condition is beautifully seen in the lymphatic glands of the kidney, liver, and lungs. The smaller glands do not show the structural elements to the same extent as do the larger ones. In such groups as the intercostal, suprasternal, and prepectoral, the colour on section is of a delicate pinkish white, and in the healthy gland it is not

easy to distinguish between the cortex and the medullary portions. The whole gland to the naked eye appears as one delicate uniform texture, and pigmentation does not seem to occur in these glands. The smallest lymphatic glands that an operator may be expected to look for in conducting a post-mortem examination belong to the following chains: 1. Those situated along the jugular furrow—well-marked in the calf; 2. the suprasternal; 3. the intercostals; 4. those running along the omentum and posterior mesentery of the large bowels and retroperitoneal which in health vary in size from a barley grain to a pea, and are therefore not always easily found. This difficulty, however, is not experienced in searching for the larger glands, such as the mammary, deep inguinal, prescapular, retropharyngeal, and mesenterics, which in cattle are well developed.

Mr. Holburn then described the situations of lymphatic glands, and illustrated their positions by lantern slides. In so doing he repeated his observations which have already appeared in *The Journal of Comparative Pathology*, vol. xii., part 4, and *The Veterinary Record*, January 19th and 26th, 1901, which are briefly as follows: *Head.*—Pharyngeal, sub-occipital, pre-auricular, or parotid, and sub-maxillary. *Neck.*—The cervical, prescapular. *Thoracic Wall.*—Sub-dorsal, intercostals, suprasternals, prepectorals, and brachial glands. *Thoracic Visceræ.*—Tracheal, mediastinal (anterior and posterior), bronchial and cardiacs. *Abdomen and Posterior Limbs.*—Mammary or superficial inguinal, deep inguinal, iliacs (external and internal), sacral, sub-lumbar, popliteal, and pre-crurals. *Abdominal Visceræ.*—Gastric, splenic, cœliac, renal, hepatic, mesenterics, and lymphatics of large bowels. Mr. Holburn continued: It is highly probable that the functions of the lymphatic glands have not yet been fully determined. I may, however, briefly allude to what is ascribed to them. The lymph glands are said to be the manufacturers of three or four kinds of cells. This is shown inasmuch as the lymph after traversing a gland contains numerous more cells than it did before entering. They are not all of the same size. The largest of these lymph corpuscles are believed to agree in their character with the white blood corpuscles; and the smaller varieties to the lymphoid cells of the lymphatic glands. Various names have been manufactured for these cells—leocoblasts, erythroblasts, eosinophilous cells, &c., and since the lymph is poured into the blood-stream the lymph corpuscles are looked upon as constantly furnishing a fresh supply of white cells to that fluid. In Dr. Hamilton's Pathology, vol. 1, cxxxi., a most interesting account is given on the source of the blood corpuscles. His conclusions are to the effect that the lymph glands are not only mainly responsible for the leucocytes, but that these in turn are converted into the coloured corpuscles, and that those white cells which do not become so transformed subserve many useful purposes, such as removing dead tissue and protecting the body against the invasion of micro-organisms. Apart from the cell genesis, and the lymph glands, placed as they are on the course of the lymphatic vessels, it is claimed that they have a certain filtering action upon the lymph stream. This function is borne out from pathological observations of which tuberculosis may be cited as a good example. It is well known that in this disease the lymphatic glands act as barriers against its dissemination by arresting the injurious elements that are carried on to them by the lymph stream from the centres of infection, and in many instances rendering them inert.

So far as meat inspection is concerned, the importance of examining

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the lymphatic glands cannot be too highly estimated, and especially so when you are dealing with a carcase *minus* the internal organs. The changes wrought in the lymphatic glands (whether in a local or general manner) are undoubtedly due to injurious matters having reached the lymphatic stream and charging the glands beyond their physiological limit, hence establishing a morbid change. With regard to tuberculosis, the lymphatic glands are the most common seat to demonstrate its existence.

It has been firmly established that the bronchial and mesenteric glands may be clearly affected, and yet no evidence of its presence is capable of being found in either the lung tissue or the lining membrane of the bowels. In such instances, each of these organs must have received a dose of tubercle bacilli, but that without exciting a tuberculous lesion; taken up by the lymphatics and arrested in the first lymphatic gland. These facts have a most important bearing upon post-mortem examinations made after testing animals with tuberculin. For my part, I have made post-mortem examinations on a great number of reacted animals when the only visible tuberculous lesion was to be found in a bronchial or perhaps mesenteric gland. It is in such cases as these that the test is brought into disrepute when a careful examination is not made. Even from the point of view of meat inspection, many groups of glands should be exposed in searching to ascertain the extent of a tuberculous dissemination.

In mentioning a few peculiarities I should say, in speaking of the chest, that although the pleura may be free, if the lungs or bronchial glands are affected, and especially if the lungs contain diseased patches near their periphery, the intercostal and suprasternal glands should be examined. They may not be diseased, but it is at times puzzling to know from what point they have become affected. It will be taken for granted that these two latter groups of glands should never be overlooked when the pleura is diseased. In tuberculosis of the diaphragm the infection is spread to the suprasternal and mediastinal glands; consequently their examination is valuable, though the diseased diaphragm has been removed. In tuberculosis of the mesenteric glands where no visible tubercle exists on the peritoneum, the sub-lumbar, iliac, deep inguinal, and even the mammary gland will sometimes be found very tuberculous. These cases are very annoying, for while a butcher may have no objection to losing a hind quarter of beef when he sees abundance of tuberculous peritonitis, he does not like the idea when the disease is concealed in these glands.

It is very difficult to understand how these glands become affected in what may be described as a backward direction, inasmuch as it is generally assumed that chyle, after leaving the mesenteric glands, is collected by the lacteals, and discharged into the receptaculum chyli, about the first or second lumbar vertebræ. Thus the glands beyond that point would be expected to remain clear. This peculiar mode of invasion of the lymphatic system was pointed out by Professor Delépine[1] in 1893, in consequence of inoculating guinea-pigs with tuberculous material, and he suggests that two methods of extension are accountable. First, an extension along the course of some lymphatics in the direct opposite to that of the stream. Secondly, an extension through the lacunar system of lymphatics. Professor M'Fadyean[2] has also touched upon this question, and in speaking of how these glands become affected from a tubercular peri-

[1] Vide *British Medical Journals*, September 1893 and March 1894.
[2] Vide *Journal of Comparative Pathology*, Vol. XI., part 3.

tonitis, he brings forth the term "centrifugal" as distinguished from "centripetal," in which the infection spreads in the direction of the normal lymph stream. Examples of the centripetal method of dissemination are seen in the secondary infection of the bronchial glands from a primary focus in the lungs, or of a mesenteric gland from an ulcerated intestine.

In searching for evidence of tuberculosis in the lymphatic glands it is important to remember that the invasion often assumes the form of an acute tubercular adenitis, which is to be recognised by a swollen gland of a finely granular appearance, somewhat doughy in colour, which may not present any centres of necrosis or caseation, and seldom to the naked eye appear congested.

The changes observed in lymphatic glands are also of great value in inflammatory and septic diseases. In acute inflammatory affections, such as pneumonia, pleurisy, gastritis, enteritis, peritonitis, metritis, &c., the lymphatic glands soon become congested, and even black in appearance. And it must be regarded as a grave indication when the lymphatic glands are found universally congested or inflamed. This phenomenon is accounted for by the fact that changes in the character of lymph correspond very closely with changes in the character of the blood. In all acute inflammatory affections the blood becomes rapidly altered and toxic matters quickly generated. These conditions result in producing a marked effect upon the lymphatic glands. In observing a general congestion of the lymphatic glands I always have the carcase quartered in such a way as to expose the deep muscles of the thigh or shoulder, and invariably this reveals a sticky or gluey condition of the muscles, which indicates that an albuminous exudate has been thrown out, or, in other words, a true inflammatory fluid.

With regard to septic infection, such as are met with in septic pericarditis, septic peritonitis, septic metritis, &c., the lymphatic glands are usually much swollen and of a cinnamon to a chocolate colour. They may contain small abscesses or necrosed centres having a putty consistency. In old-standing cases of septic metritis (inflammation of the calf bed) and pericarditis, I have on more than one occasion seen what we may call a pyæmia of the lymphatic glands.

In acute inflammation of the udder in cattle the first glands that become swollen are the supra-mammary, next follows the deep inguinal, and then the iliacs, so that in examining a dressed carcase, after the butcher has finished his handiwork, by looking at these glands one is frequently able to say if mastitis has existed, although the organ itself has been removed.

HÆMOGLOBINURIA OR AZOTURIA.[1]

BY A. J. BECKETT, M.R.C.V.S.

MR. PRESIDENT AND GENTLEMEN,—On being asked by our Secretary to read a paper before you this evening, I found myself in rather a quandary —first as to what I could write about; secondly, as to what subject would produce a good discussion and be most generally interesting; the arousing of general interest and a consequent free discussion being, I take it,

[1] Read at a Meeting of the Veterinary Medical Association of Ireland on 31st January 1902.

one of the most important objects of a paper in an Association like this. On thinking the matter over I came to the conclusion that hæmoglobinuria or azoturia is a subject which would interest most, if not all. Our knowledge of the disease is incomplete, consequently treatment is frequently unsatisfactory and fatality marked. It is in the hope of elucidating your experiences, and possibly obtaining some light on what is to me, for one, a very dark page, that I venture to bring the subject forward.

The pathogeny of the affection is, so far as I can discover, an extremely vexed question at present. Theories there are in plenty, but no generally accepted one, which leaves the clinician quite in the dark as to the cause of the lesions he meets with, and renders treatment necessarily empirical.

It wants no argument to prove this a most unsatisfactory position. We cannot feel sure that we are on the right lines until something at least has been discovered as to the causal agent of the malady. Rest in the stable while receiving working rations, which all authors are agreed appears necessary, if not indispensable, to produce or predispose to an attack, is not of itself sufficient. If it were, one would be called on to explain the immunity enjoyed by many horses in good condition receiving high feeding, which are frequently left in the stable for days together.

Then, also, when a case occurs in a stud which has been stabled for several days, it is most unusual to have more than one, or at the most two animals attacked, though all are subjected to the same conditions as regards rest and feeding. So that it seems reasonable to assume there must be an exciting, as distinguished from a predisposing cause.

ETIOLOGY.

Many theories have been published by writers on this subject, the substance of some of which I purpose laying before you as concisely as possible. The limits of an ordinary paper will not permit of giving the full details, nor is that either expedient or necessary. All I aim at is to place before the members a few of the conflicting statements and theories advanced (with most of which you are doubtless already familiar) in order to stimulate discussion on this point.

In Cadiot's *Veterinary Medicine and Surgery* exposure to cold and subsequent chill is mentioned as an exciting cause. He states that the attacks are most prevalent in winter, late autumn and spring, and that even sudden lowering of stable temperature, by causing chill, is sufficient to induce the disease, without exercise or indeed without the horse leaving the stable at all. Such has not been my experience, and I would like the opinion of the members present as to whether this can be at all common.

Another theory given by Cadiot is "that rest with abundant feeding favours the production of intestinal poisons; these on being absorbed produce the symptoms seen; that consequently the lesions observed are secondary, and a result of the absorbed toxines or ptomaines."

Professor Williams in his *Veterinary Medicine* quotes Haycock as recording three cases, two of which occurred in hot sultry weather. He states that he never met with a case that was attacked prior to exercise, and that exercise appears necessary to produce it.

As to the cause, Williams believed it due "to a hypernitrogenous condition of the blood and system, that the blood before exercise contains a

superabundant quantity of albumen, that movement induces a rapid oxidation of this transforming it into urea, &c." The excessive secretion of urine and excretion of urea being the physiological result of the effete products present. The spasm of muscle, &c., being accounted for by the deleterious material in the system.

In *The Journal of Comparative Pathology* M'Fadyean directly controverts this view, and gives several analyses to prove that the percentage of urea in these cases averages three, which is about normal. He states that he has discovered "there is a remarkable increase in the red corpuscles of the blood, that they sometimes even double in number." From calculations made with the hæmocytometer he makes the normal number seven to eight millions per cub. mm., and has found them as high as fourteen millions in this disease. He concludes that this marked increase is due to rest and high feeding, and that the starting-point of the disease is "an over-production of red cells uncompensated by a steady destruction such as goes on in health." He also disputes another theory brought forward by a continental observer, namely, "that the disease is of a nephritic origin," and affirms that nephritis is neither a necessary or common sequel, and therefore if present is only secondary or accidental.

Bollinger, in 1877, described the disease as a "Hæmoglobinuria toxæmia," and ascribes the symptoms to a toxic principle formed.

Dieckerhoff believes "that there is an abnormal transformation of albuminoids and carbo-hydrates forming lactic and isomeric acids in the affected muscles. That the acid products produce muscular irritation and spasm, and being absorbed lead to destructive changes in the red cells, tending as well to neutralise the normal alkalinity of the blood." He also opposes the view that chill is a physiological factor in the disease.

These, gentlemen, are a few abstracts from the many theories published by observers and pathologists, and are quite sufficient to prove, if that were necessary, how little is yet known with regard to the "pathogeny" or "generation" of this affection. Speaking personally, I imagine a careful perusal of the conflicting statements and theories advanced will not enlighten but rather tend to confuse the clinician who thus seeks for guidance as to his line of treatment. Doubtless it is quite open to any one to adopt one of these theories and be guided accordingly, but where so many skilled observers are at variance one cannot but feel that nothing reliable is yet established as to the etiology of this fatal malady, and that if any of these theories be the correct one satisfactory evidence to that effect has not yet been furnished.

CLINICAL SYMPTOMS.

Here we are on firmer ground. The symptoms commonly present are agreed on by all observers. To begin with; the history generally given the practitioner by the driver or owner is substantially as follows. The affected horse had been standing in the stable for some days while receiving normal feeding (two days has been the minimum in any case I have seen), had pulled out fresh, and had been in particularly good heart at starting. After going some distance (which distance varies very considerably) lameness or general stiffness had been noticed. In bad cases the horse had stopped, begun to sweat and shiver, and had shown signs of pain and uneasiness, which the driver usually attributed to colic. If not unharnessed at once the animal may fall and lie struggling in the road. Should a fall

occur it is generally so awkward and helpless a one that there is grave danger of a complicating lesion in the form of fractured innominate bone, two cases of which I have met with.

It is, in my experience, most unusual for a horse to regain his own stables should the attack have taken place when he was at some distance from them; at all events without receiving substantial aid. The practitioner may find his patient on the road, in a field, or in the nearest available shelter, and has then to decide as to treatment on the spot, or whether movement is advisable or feasible.

I may premise here, in order to prevent possible misunderstanding, that I am speaking only of severe cases which have been practically run to a standstill, not of the so-called mild cases with only slight paralysis. In the city, owing perhaps to the "harder" feeding, the attacks are largely of the severe type.

On reaching the patient the symptoms visible will vary considerably according to the severity of the attack, the animal's disposition, and the type of the disease, nor need all the usual symptoms be present at the first examination. The clinical evidence at such times may be of a very unsatisfactory nature, and call for both caution and skill on the practitioner's part to avoid an error in diagnosis, particularly should the history not be then available. Taking a severe case: The animal is found lying unable to rise. He may be in a state of frenzy from excitement and fear. The face is anxious, very much so in some horses, there is frequent looking back at the hind quarters, sweating, rigors, and more or less struggling, with ineffectual efforts to rise. As a rule the inability to rise is plainly due to loss of motor power in the loins and quarters.

If one leg only be affected at this stage the muscular symptoms are naturally confined to it, and taken singly might possibly lead an unwary observer astray. The pulse rate and tone largely depend on the animal's condition and temperament, and the amount of exhaustion present due to struggling and excitement, so that no rule can be laid down with regard to it. The temperature again is very largely affected by these conditions. It may be only slightly above normal or fairly high. Fever, however, apart from the causes alluded to, does not appear to be a marked feature in the disease. The mucous membranes may be only moderately or intensely injected. Respiration is much more hurried in nervous excitable horses, who are inclined to fight hard, than in quiet sluggish animals; and again, depends greatly on the factors mentioned in connection with the pulse and temperature. The affected muscles, or group of muscles, are generally tense and hard to the touch, and partially (in bad cases almost wholly) insensible to stimulation. Heat, also, may be a marked feature locally.

Examination of the urine, if necessary by means of the catheter, should never be neglected, as its appearance is a most valuable aid in diagnosis. The usual tint is reddish to coffee-coloured, and it may be either scanty or abundant. I have met cases in which the urine at the first examination has not been appreciably darkened; the coloration only becoming evident after some hours. This condition, if it be met with, might also tend to lead one astray, unless other symptoms are plainly developed. I may mention here that one practitioner has informed me he has detected an odour simulating dog's urine in the sweat often so abundant on the skin.

Should the subsequent course of the disease be favourable, after two or three days a change will be noticed both as regards the muscular spasm

and the coloration of the urine. Motor power is gradually regained, and unless there is evidence that this is slowly taking place by the third or fourth day prognosis would have to be extremely guarded or preferably unfavourable. The gradual return of the urine to its normal colour must also be regarded as a favourable symptom. Unfortunately in these cases the patient frequently so exhausts himself with struggling, and bruises are so numerous and aggravated, that death may occur from marasmus. Or the owner, if he be a humane man, may express a desire for the knacker's services; and no doubt in many of these instances it is the best treatment, looked at from a utilitarian standpoint.

Continual fighting and consequent high fever and exhaustion, refusal to feed, and increase in the area of muscle affected, its total insensibility, with an augmentation of the dark coloration of the urine, are all most unfavourable signs. Brain symptoms are sometimes seen, and one might find it hard to state their precise origin. Needless to say they, if present, materially contribute to the depressing influences already so potent. The animal may die from cardiac failure, from exhaustion due to insufficient nourishment, or from complicating lesions (such as pneumonia). When there is partial suppression of urine or retention, no matter how caused, uræmic poisoning is an additional factor to be reckoned with.

I have now given what does not profess to be more than a general outline of the symptoms personally observed during the various stages of the disease, purposely avoiding precise details regarding pulse, temperature, &c., which to my mind to be of value must be supported by accurate statistical proof. These unfortunately I have not preserved in a form to be of service here.

TREATMENT.

Dieckerhoff bases his treatment on his theory that the alkalinity of the blood is neutralised. He recommends in the first instance a hypodermic injection of eserine or barium chloride in order to cause a rapid evacuation of the bowels contents. This is followed promptly by large doses of bicarbonate of soda, given in ball, drench, or food, as much as ℥xvi. being administered daily if thought necessary without ill effect. Soda bicarbonate is stated by some observers to have a specific antitoxic action and to promote the absorption of metabolic products. It is said to be useful in prophylaxis also. Owing to its cheapness and the ease with which it may be administered, its claims to these valuable properties may be tested by all.

Cadiot prescribes what is practically Dieckerhoff's treatment. Symptoms of excitement, collapse, and other complications to be combated as they arise. The animal if sweating to be thoroughly dried, hand rubbed, well covered, and its general comfort attended to, turned several times daily, and urine and fæces withdrawn if necessary.

A Russian veterinary surgeon advocates the employment of eserine hypodermically, bleeding to the extent of five or six pints, and bromide of potassium dissolved in distilled water, 18 or 19 ounces being given the first day and repeated if necessary. The loins to be well rubbed with spirit of camphor, a cold compress then applied and well covered with dry cloths.

Williams recommends physic in the form of ball or oil, and if the kidneys are not active, diuretics, particularly colchicum. Enemas if necessary to assist purgation, and the animal to have a free supply of water. He deprecates "aggravating the disease by either stimulants or sedatives at first," but advises nitrous ether about the third day if depression is marked.

Fomentations and blisters to the loins are stated to be of no service, but prejudicial by causing excitement and struggling.

All authors concur in the advisability of slings if the animal is capable of keeping on his feet, and vigorous hand-rubbing when the muscular tone is returning. Marked atrophy of the muscular area affected is sometimes an annoying sequel to a bad attack, and much retards the patient's return to usefulness.

I may be particularly unfortunate, but I have never had success in the treatment of a bad case of hæmoglobinuria. Either the disease, the complications, or the exhaustion proved fatal if the animal was allowed to live so long. Slaughter, in my experience, has been the fate of the great majority of severe cases. This termination when frequent is distinctly disheartening to the practitioner.

I have tried Dieckerhoff's treatment in two cases which came under my notice lately, both of which were slaughtered, as their symptoms gave no ground to hope for a favourable termination. Williams' advice on this head, amongst others, has also been carried out with similar results. I am therefore naturally looking forward to this part of the discussion, in the hope of a practical hint which I may test on the next opportunity.

In no disease, it seems to me, does it come home to one so forcibly that, owing to our ignorance of etiology, treatment is painfully empirical, and, as a logical sequence, is followed by distinctly uncertain results. There is here grave need for research, and clinical evidence, if reliable, might prove an extremely valuable corollary.

PROPHYLAXIS.

This may be dismissed in a few words. Common sense regulation of the feeding in quantity and quality and when resting in the stable from any cause. Reduction in the quantity of oats, maize, &c., and the substitution of bran mashes when necessary is all that is indicated or required.

POST-MORTEM APPEARANCES.

The principal lesion seen (if the case has been a bad one and several days have elapsed before death or slaughter) is a marked anæmic paleness and soddenness of the muscular areas affected. On section through these, petechial hæmorrhages are usually evident. The kidneys I have sometimes found congested with petechiæ fairly well marked; in other cases they are apparently normal to the naked eye. The liver, spleen, and other organs have not been affected in any way that one could attribute to the disease. Fatty liver I have seen, but as this is very common on post-mortem of aged horses it may be accidental. The lungs are usually congested hypostatically, and there may be more or less pneumonia, which is a complication we always dread in these cases. The heart I have not found visibly diseased on naked-eye examination.

As regards the microscopical lesions seen in the affected muscles and kidneys, Professor M'Fadyean describes them as follows: The muscle fibres are more or less disorganised, the striation being partly or wholly lost, from waxy degeneration of the sarcous substance. The kidneys, he states, may show distention of the uriniferous tubules with the free pigment and changes due to the pressure of the infarcts thus formed. The blood contains a large quantity of pigment in solution, which may

crystallise out after death in the various organs, and plug the smaller arteries and veins. The fact that this takes place may account for the muscle spasm and lesions by interference with the local blood supply. Why this should be confined to a particular area of muscle does not seem at all clear.

In conclusion, Mr. President and Gentlemen, I may state that I found it necessary (in order to confine this paper to reasonable limits) to cut out much matter which might have been properly admitted, and to deal lightly only with what I have introduced. Aware as I am of my many shortcomings in this and other respects, I trust you will still find ample material for a prolific discussion in what has been read.

SHIVERING.[1]

BY W. HUNTING, F.R.C.V.S.

A CURIOUS case of "shivering" having come under my notice just at the time your secretary asked me to attend this meeting accounts for my having chosen the subject for consideration to-day. Possessing no special knowledge of the disease, and being ignorant of its morbid anatomy and pathology, I am forced to confine myself to a mere outline of the subject, but I hope the discussion to follow will fill up some of the details, and so supply a fuller picture of the malady.

"Shivering" is a condition most frequently seen in the heavier class of horses. I have never seen it in ponies, seldom in hunters, and not much more often in the light class of harness horses. It is said to prevail more in some districts than others, and perhaps Scotland has the unenviable distinction of showing more cases than the rest of the kingdom. This fact may be due to some local conditions with which we are unacquainted, or it may be due to the preponderance of a class of horse predisposed to attack. If the disease is transmissible from parent to offspring it is obvious that the breed specially found in a district may account for an extra proportion of "shiverers," without looking for any other local conditions. On this point I have personal experience, but I am informed by men of undoubted intelligence and large experience that the disease is often seen in animals whose sire or dam was afflicted by "shivering." If this observation can be corroborated by the independent testimony of men occupying districts differing in their soils, climates, and vegetation, we shall have strong evidence that the disease is hereditary. If heredity plays a prominent part in the production of shivering, it is essential that we should collect that evidence, and lay it before those authorities who have power to check the use of brood animals suffering from hereditary disease. That prizes and certificates should be given to horses suffering from an incurable and transmissible disease is a blunder of the first magnitude, and every one really interested in the production of sound stock should assist in putting a stop to it. Even if the authorities do not at once accept veterinary opinion, our duty clearly is to go on observing and recording our experience, so that horse-owners may be aware of the facts. If our observations go to show that heredity plays no part in the causation of "shivering," it is equally im-

[1] Read at a meeting of the Eastern Counties Veterinary Medical Association 13th February 1902.

portant that we should make it public, so that the real cause may not be overlooked.

Horses suffering from "shivering" are incurable, are partially ncapacitated from work, and are almost certain to prematurely end their existence as the direct result of the disease. It is therefore not so much cure as prevention to which we should devote our efforts. The disease is progressive, and although it may not be so apparent in very young horses as to stop their sale, it becomes more marked with age, and causes increasing incapacity for work. Therefore owners avoid purchasing even slightly marked cases, and the breeder is adversely affected.

The term "shivering" is not an exact one. It simply denotes a set of symptoms—the most prominent being trembling or shivering of the muscles of the hind-quarters. In its early stage no single symptom is diagnostic. In one case you may have a suspicious movement of the tail, in another an erratic movement of the hind legs. Sometimes the symptoms are intermittent, and not producible by any method the surgeon may adopt. At others a sign may be developed with certainty. In the most aggravated cases symptoms are evident which are not shown by any horse in the early stage.

An average case of shivering may show no abnormality whilst the horse is unexcited and moving forward at a walk. When stopped suddenly, especially if drawing a load, there may be evidence of a little want of control over the movement of the hind extremities. If an attempt be made to back the horse, a great difficulty is experienced, and in some cases it is impossible. The hind feet are not raised from the ground, the back is arched, and the muscles of the quarters are rendered rigid or convulsed in a way well described as trembling or shivering. When turned sharply the hind legs move in a jerky, uncontrolled manner. When startled or backed the tail is spasmodically elevated, and this, perhaps, is as marked a peculiarity as any other. If an attempt is made to raise one of the hind feet, there is great difficulty. If it be successful the limb is snatched up, and the muscles of the thigh and quarters show the spasmodic contractions so characteristic. In no place is this more certainly induced than in a shoeing forge, possibly because the horse is more easily excited owing to his surroundings, and his memory of previous times when his feet were raised and kept up during the operation of shoeing.

In passing, let me just ask a question bearing on legal responsibility to owners of horses, farriers, and their workmen—What is the best way of shoeing a bad shiverer? What amount of restraint and force is requisite and reasonable—how best applied?

Diagnosis.—As the disease arises very gradually, progresses slowly, and is not always marked by the same symptoms, diagnosis in many cases is difficult, and at times impossible. When the signs of disease are intermittent a horse may be rejected by a veterinary examiner to-day and passed by an equally expert man to-morrow, to be rejected again, and properly so, in a week. Professor M'Call relates a case that was examined by him every day, and not until the sixth day did he detect symptoms of the disease. Not every one examining horses makes a rule to back them and turn them round.

So long as he examines only light horses probably few special lesions will be overlooked; but with heavy draught horses, turning and backing seem to me indispensable methods of arriving at a correct opinion. I

would also add that raising one or both hind legs is advisable. Some shiverers show decided symptoms when taken to a water-trough or when offered a pail of water on the ground. As soon as they extend the neck the hind-quarters are seized with a spasm, and whilst the fore-feet remain implanted on the ground the body is thrown backward, the back arched, and the tail and quarter muscles convulsively "shiver." I have seen bad shiverers that would face a water-trough without a sign.

Mere want of control over the hind-quarters is not a symptom of shivering. We see this in various other conditions which are not accompanied by any rigidity or convulsive movement of the muscles of thigh and quarters. As the result of spinal injuries or disease we have symptoms of want of power in the hind extremities, but no trembling or shivering. We see various degrees of inability, of partial paralysis, but the distinction between these cases and those called "shivering" is in the presence of trembling, shivering, or muscular spasm. In cases of azoturia we have continuous muscular rigidity—not trembling. In some rare cases we see cramp of the muscles of the thigh in front of the femur, but this is marked by more or less prolonged contraction—not the alternating contraction and relaxation which causes trembling.

A peculiarity of the disease is that it is aggravated by fright, and a railway journey has been known to render prominent all the symptoms of shivering in a horse which before the journey was not known by its owner to suffer from any unsoundness.

The same aggravation of symptoms may accompany an attack of strangles or influenza. Some of these cases present such acute symptoms of cerebro-spinal disease as to cause the greatest alarm. There is a great constitutional disturbance—shown by pulse and respirations being doubled in frequency. Partial paralysis of the hind extremities is seen. Muscles of neck, back, and quarters are rigid. Movement either backwards or forwards is almost impossible, and the countenance expresses fear and pain combined. As a rule the symptoms gradually subside, and the horse resumes work with no inability save that shown when backed.

These cases are not unlikely to give rise to misunderstandings and consequent lawsuits. If what I have said be correct there is much room for misunderstanding, and veterinary surgeons should be extremely careful in giving opinions about the length of time "shivering" has been in existence. About half the lawsuits relating to soundness in recently purchased horses are due to veterinary surgeons hazarding opinions as to the time certain lesions or symptoms must have existed. In many cases the opinion is the result of limited observation, and in still more there is room for considerable latitude of opinion as to the duration of a condition only seen for the first time. How long has a splint or a spavin existed—how long have they caused lameness? These are easy questions compared with similar inquiries as to shivering. I would like to ask this meeting if there is anything positive about shivering which would warrant an opinion as to the time the symptoms have been visible to an expert observer? I rather doubt it!

Shivering is not uncommon, and affected horses live for years and gradually get worse. There must therefore be many possibilities of post-mortem examination, and we should expect there must be well-marked lesions in the older cases. For all this, I know of no printed description of the lesions, and I have myself never seen a post-mortem examination of

a shiverer. European works on surgery do describe sclerosis of the spinal cord in the lumbar region as the lesion attending this disease. Professor Macqueen tells me that some work on the subject was done at the Glasgow Veterinary College a few years ago, and that a number of post-mortem examinations disclosed the same changes in the spinal cord as are described by Continental observers. These, I believe, are a hardening of the structure of the cord, due to increase in the quantity of the connective tissue elements, with consequent pressure on the nerve cells and fibres.

I would suggest that when any of us obtain the opportunity of a post-mortem examination on a good, well-marked, old case of shivering, we communicate with the Royal Veterinary College, and endeavour to have some careful observations made and published.

I will conclude by reading my notes on the case I referred to at the commencement of this paper.

On the morning of January 21st I was asked to see a horse that had been found in the stable "blowing." It was thought to be an ordinary case of congestion of lungs, and preparations were made to give a draught. On attempting to raise the horse's head for this purpose a convulsion occurred and the animal nearly fell. On this I was called in.

I found this patient—a big roan waggon horse—tied up in the yard. The near fore leg was propped out in front as though to give steadiness. The off hind was resting on the toe and trembling. The respiration was about 80 per minute, and the pulse at the jaw hardly perceptible. I had him moved and he walked sound, but had only gone a few yards when he stopped, extended his neck, and hung back without moving his fore feet. All the muscles of his body seemed tetanically convulsed. This lasted perhaps half a minute, and then a few minutes of relaxation occurred, followed by another seizure.

He was placed in an airy loose box, his head being tied to a rail in front. All the morning he stood there, sometimes free from spasms, but at intervals seized with what almost looked like tetanic convulsions. This horse had worked the day before as well as usual. He had eaten about half the forage from the manger during the night. No accident or fright had occurred so far as could be ascertained. I unnerved this animal two years before, and he was a mild shiverer at the time of the operation. No similar attack was known. No medicine was given, and I confess I thought death was certain — so certain that I had arranged for a careful post-mortem examination.

By the afternoon of the 21st the "blowing" had largely subsided. The convulsive seizures appeared at longer intervals and were milder. By evening he seemed recovering, and next morning had so far recovered that he was returned to his own stall. He has now resumed work apparently as well as ever.

During the day he stood in the loose box his near fore foot was always propped out in front and abducted from the body. The foot was often raised from the ground and shifted an inch or two to the side, or backwards or forwards. This motion wore a hole in the ground two or three inches deep. The floor was soft, only clay and gravel.

Before and after this attack the horse showed the same symptoms. He worked daily. He could not back a load. He can be backed without a load, but not easily, and the jerking of tail and trembling of muscles of thigh and quarter are all that tell of his complaint. He faces a water-

trough without trouble, and drinks without any increase of his usual symptoms. It is difficult to lift either of his hind feet, but he is shod like other horses only with extra labour to the farrier.

Is shivering in every degree unsoundness?
Is it hereditary?
Is it equally transmissible through sire and dam?
Does it vitiate a warranty of "quiet in harness"?
Does it vitiate a warranty of "good worker"?
Can any man say, after examination and a knowledge of the horse for an hour or two, how long the disease has existed?
Does working a bad shiverer constitute "cruelty"?
Is failure to diagnose a sign of negligence?
Has it ever been seen in a pony?
What breeds are most often affected?

LANCASHIRE VETERINARY MEDICAL ASSOCIATION.

THE annual meeting was held on February 7th, 1902, at the Grand Hotel Manchester. The President of the Association, Mr. R. C. Edwards, Chester, occupied the chair, and delivered the Presidential address. He thanked the members for electing him to the position of President, which was the highest honour a society could bestow on one of its members. He made reference to the industry and ability of those who had preceded him as presidents of the Lancashire Society, and hoped that he might be able to fulfil the duties of the office with credit to himself and honour to the Society.

Mr. Edwards then proceeded to draw a striking picture of the average veterinary surgeon of forty years ago, giving details of the college curriculum and the professional examinations. From this he filled in the various methods of diagnosis then in vogue, with examples of treatment and a criticism of results. In contrast to this picture he carefully went over the points in the training of the veterinary surgeon of to-day. He thought that the entrance examination, whilst not too high, was quite high enough; and the colleges and professors worked their best to train the men, and that taken as a whole he doubted if any other profession turned out graduates better qualified for their duties than our own.

Mr. Edwards paid a high tribute to those who had risen to eminence in days gone by, by hard progressive study, from so small a training at college. He warned the younger members that much had to be learned by care and observation after even the diploma had been gained. He pointed out that success did not come in a day, but required time, patience, and self-denial.

Particularly should the practitioners be careful not to make mistakes which by ordinary care would have been avoided. He knew that the best men in all vocations made mistakes, but he thought that those mistakes were made from not looking rather than from not knowing, and he would warn the young men against falls of this kind.

Mr. Edwards then referred to a variety of trades and callings which some veterinary surgeons added to their proper occupation, and contended that it was more dignified to rely on the practice of the profession solely.

Mr. Edwards then dealt with the remuneration awarded the profession, and thought that as a whole it was under-paid. He afterwards read a copy of a diploma granted on the 25th June 1840, bearing thereon the names as examiners of Wm. Sewell, Chas. Spooner, Astley Cooper, J. A. Paris, Edward Stanley, Barnsley B. Cooper, Richard Bright, and Joseph Henry Green, and Mr. Edwards concluded by thanking the members for their attendance, and hoping that they would enjoy themselves at the dinner.

PRELIMINARY OBSERVATIONS ON SKIN DISINFECTION, AND WOUND INFECTION.[1]

BY VERANUS A. MOORE, ITHACA, N.Y.

It has been my privilege, during the last few years, to study somewhat closely and to have certain investigations made concerning the bacteria of the skin, the efficiency of certain disinfectants, and the bacterial contents of various wound infections, more especially in the horse. While our work in these lines is but fairly begun, the results already obtained seem to warrant a discussion of the preliminary findings in so far as they bear upon antiseptic and aseptic methods. In carrying on these investigations, I wish to acknowledge the aid received from Drs. R. J. Stanclift, C. W. Gay, and E. C. Shaw, who, as students in advanced bacteriology, have rendered much valuable assistance. I desire also to express my indebtedness to Dr W. L. Williams for his hearty co-operation and for furnishing material from his surgical clinic.

In the first application of bacteriology to comparative medicine it was natural that investigations should have been made respecting the etiology of the more serious epizootic diseases. However, the significance of bacteria in wound infections claimed early attention in human surgery, and it is along the line of asepsis that the teachings of bacteriology are at the present time accomplishing, perhaps, the greatest amount of good. In veterinary surgery, however, antisepsis and asepsis seem to have received less attention than they rightfully demand. The fact is recognised that the domesticated animals are, as a class, less susceptible to invading micro-organisms than man, and consequently the cause for the quite prevalent assertion among practitioners that in the lower animals there is little or no need for antiseptic precautions. Nevertheless, the not uncommon infections with serious loss, warrant an inquiry into the entire subject of skin disinfection as applied to these animals.

My attention was first called to the desirability of a better knowledge of the bacteria of the skin and the efficiency of some commonly used disinfectants, in studying the cause of certain lesions following surgical operations where the prescribed disinfecting methods were carefully followed. An inquiry into the source of the bacterial findings in other chronic lesions more distant from the seat of skin laceration or injury, but which seemed to be traceable to them, suggested still further the importance of this knowledge. The more interesting of these chronic disorders of a local nature are those commonly known as scirrhous cord or botryomycosis, omphalophlebitis, infectious cellulitis,[2] the commonly called "foot-rot" of sheep[3] and other

[1] From the Proceedings of the American Veterinary Medical Association, 1901.

[2] I described (*Am. Vet. Review*, June 1898) an infective cellulitis in cattle, due to a streptococcus.

[3] A disease reported as "foot-rot" in sheep has been investigated and found to be a

though similar conditions. In taking all of these disorders, operative and traumatic, into the list of wound infections, it is necessary to include as wounds all lacerations, incisions, and punctures whether of sufficient size to be detected or not. In fact, it does not always seem necessary to have even a puncture, as blows or intense straining of the integument may be sufficient to liberate into the living tissues bacteria deeply seated in the ducts of glands and possibly the hair follicles of the skin. The problem before us resolves itself into three quite distinct parts, namely :—

1. The determination of the bacterial flora of the skin.
2. The finding of the degree of efficiency of different disinfectants when applied to the integument; and
3. The finding of the species of bacteria which produce the more chronic disorders here included in wound infections.

In starting with the existing methods of preparing the field for operations we find practically the same procedure recommended in veterinary as in human surgery. It is desirable, therefore, to compare the structure of, and the bacteria of the skin of man and of the horse, in order to determine whether or not the method prescribed for the first is equally applicable for the second. If we follow the results of the every-day operations there seems to be more frequently in veterinary than in human surgery either acute wound infection or chronic and possibly metastatic lesions of a more or less serious nature. The question whether this is due to the operator, or, bacteriologically speaking, ill-considered methods, is waiting for an answer. It is true that veterinary surgeons, who follow the prescribed course, may very largely prevent these otherwise common sequences, but it is for the prevention of the occasional failure that the best methods are striving.

In comparing the structure of the skin we will, at this time, mention but two features which suggest greater difficulty in preparing the operative field in the horse than in man, namely—(1) the presence of a thicker layer of dead epithelium, and (2) longer and deeper-seated glands and hair follicles.

Investigations concerning the bacteria of the human skin have been carefully made by a number of workers, among whom may be mentioned Bizzezero,[1] Mittman,[2] Unna,[3] Bordoni-Uffreduzzi,[4] Furbringer,[5] Preindlsberger,[6] Robb and Ghriskey,[7] and Welch.[8] The researches of Robb and Ghriskey and Welch have shown that, in addition to the varying bacterial flora of the epidermis, there is in the deeper layers, within the ducts of glands and possibly along the hair shafts, a micrococcus, belonging to the staphylococcus group, which seems to be a quite constant inhabitant of the integument. It frequently appeared in surgical wounds, and, while it seemed to be possessed with little pathogenesis, it was often the apparent

cellulitis resulting in suppuration, in some cases above and in others under the hoof. In the latter instance the hoof changes came as a secondary result.—(*Am. Vet. Review*, Feb. 1900.)

[1] Virchow's Archiv. Bd. 98.
[2] *Ibid.*, Bd. 113.
[3] *Monatshefte fur Praktische Dermatologie*, 1889, 1890, 1891.
[4] Fortschritte der Medecin, 1886, S. 151.
[5] Disinfektion ds. Hande O. Arzter, Wiesbaden, 1888.
[6] Zur Kenntniss der Bacterien des Unternagelraumes.—U.S.W. Wein, 1891.
[7] Johns-Hopkins Hospital Bulletin, April 1892.
[8] Trans. of the Congress of Am. Physicians and Surgeons, vol. 2 (1891).

etiological factor in stitch abscesses. A very extensive series of examinations of the skin is being made by Dr. W. G. M'Donald, of Albany. His preliminary reference [1] to this work shows that it is not always easy to obtain, in the human subject, a perfectly sterile field of operation.

In the horse, we find very similar conditions. The bacterial flora of the untreated skin is very rich in both numbers and species. Like that of the human subject, it is exceedingly variable in different individuals and on different surface areas of the same individual. Technically, however, the bacteria resting simply on the surface of the body, where they have been brought and lodged by various agencies, cannot be considered as belonging to the bacterial flora of the skin. This term should include only the bacteria that are inhabitants of the deeper layers of the epidermis, the ducts of glands and hair-shafts and follicles. In the horse this flora, which is indefinite and exceedingly variable, consists of a number of genera of bacteria, but certain micrococci and streptococci seem to predominate, although bacilli [2] are often present. Among the numerous bacteria which have been found in the skin, our attention thus far has been given almost entirely to three species which are of interest from the wound-infection standpoint. From the continuous exposure of the skins of animals, it is not unreasonable, at least, to presume that many pyogenic and possibly other parasitic bacteria find their way to the deeper crevices of the integument. The three species of special interest are :—

1. A streptococcus which I have been unable to differentiate from a streptococcus found as the apparent cause of septic peritonitis following castration, and in septic pneumonia following other operations.

2. A micrococcus which grows in clumps and forms almost milk-white colonies on agar plates. This organism has frequently been isolated from cases of fistulous withers. It was not pathogenic for the experimental animals. It is very similar to the one isolated from the human skin by Robb and Ghriskey.

3. *Micrococcus pyogenes aureus.*—This differs very little from the one described from man. It has been found in closed abscesses (botryomycosis ?) apparently as the exciting cause.

It was suggested, from our earlier investigations, that these three species of skin bacteria were the essential ones [3] against which skin disinfectants should be more especially directed. Their almost constant appearance in a considerable variety of lesions of a probable wound-infection origin gave strength to such a conclusion. Accordingly, our inquiries were continued in a series of examinations made with different disinfectants to find, if possible, the most efficient agents for this purpose. Here, again, our results are but partial, as a number of substances reported as reliable skin disinfectants have as yet not been tried.

The method followed was to make bacteriological examinations of the skin of horses, either those to be operated upon or to be used for dissection. In all, ten cases may be included, in each of which nine disinfecting solutions were employed on as many different areas, with one untreated

[1] Transactions of the Medical Society of the State of New York, 1900, p. 46.

[2] Specific pathogenic bacteria, such as the bacillus of tetanus, are not included in this discussion, although they are to be taken into account in the final and best methods.

[3] *B. subtilis* is very frequently found in the cultures made from the supposed disinfected skin. Its rapid growth over-shadowing other species, renders it exceedingly troublesome in isolating the bacteria of the skin.

area as a check. In preparing the field the hair was clipped, the skin scrubbed with soap and water, closely shaven and washed again with sterile water, after which the disinfecting solution was applied and allowed to act for from eight to ten minutes. Pieces of the treated skin were then removed with sterile instruments and placed in tubes of bouillon and liquid agar, from which plate cultures were made. The pieces of skin used were about one centimeter square. The list of disinfectants, together with the results of the examinations, are given in the appended table :—

Disinfectants.	Number of cases that gave sterile plates.	Number of cases with few (5 to 30) colonies.	Number of cases where colonies were numerous, or very many.	Total.
Carbolic acid, 5 $^{a}/_{c}$ . . .		3	5	10
Potassium permanganate, 3 $^{a}/_{c}$.	0	1	9	10
Lysol, 3 $^{a}/_{c}$	0	1	9	10
Sanitas, 33 $^{a}/_{c}$	0	4	6	10
Chloronaphtholeum, 2·5 $^{a}/_{c}$.	0	2	8	10
Mercury, bichloride, ·1 $^{a}/_{c}$ aq. sol.	0	1	9	10
Mercury, bichloride, ·2 $^{a}/_{c}$ aq. sol.	0	1	9	10
Mercury, bichloride, ·1 $^{a}/_{c}$ alc. sol.	1	1	8	10
Mercury, bichloride, ·2 $^{a}/_{c}$ alc. sol.	2	0	8	10
Check, ...	0	0	10	10

A study of the culture showed the interesting fact that in 80 per cent. of those made from the fields treated with 5 per cent. carbolic acid and with the alcoholic solutions of corrosive sublimate did not contain micrococci and streptococci. The bacilli were not appreciably affected. With the other disinfectants used there was no apparent destruction of the micrococci and streptococci. It is of interest to add that of the seven species isolated from the plates and studied in pure culture, two bacilli produced suppurating lesions in the horse when injected subcutaneously.

Without entering into wearisome details, the result of our work on the disinfection of the skin of the horse indicates that the five per cent. solution of carbolic acid and the alcoholic solution of corrosive sublimate are, of the disinfectants tested, those which have a sufficiently penetrating power to destroy, in most cases, the pyogenic micrococci and streptococci in the deeper layers of the integument. Several solutions used more or less commonly as skin disinfectors do not seem, in the strengths employed, to be of value in this connection. It is very likely that it will be difficult, if not impossible, to find substances that will in all cases sterilise the field for operation.

It is instructive to note the close resemblance, if not identity, existing between the bacteria of the deeper layers of the skin and those found in the lesions in such affections as septic peritonitis, scirrhous cord, or botryomycosis, closed subcutaneous abscesses, infectious cellulitis, and

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many other presumably non-specific infections. The bacterial findings in fistulous withers and poll-evil[1] show a similar relationship to the pyogenic bacteria of the integument. The hypothesis is suggested by present findings, that possibly these troublesome lesions are the result of the setting free into the living tissues, possibly from injuries of many kinds, certain of the bacteria deeply seated in the integument. However, the results of many observations will be necessary before positive conclusions are warranted. With the other lesions mentioned, the possible relation to the bacteria of the skin is more clearly indicated. The infection from the hands of the operator or from unsterilised instruments is, of course, a very large factor in wound infection in careless or unscientific work, but in modern surgery such accidents should, at the most, be exceedingly rare. In a few cases which I have examined the infective lesions have followed operations where the usual method of disinfecting the skin was observed, the hands of the operator cleansed and washed in bichloride, and the instruments boiled just prior to the operation. While this does not exclude external infection, it suggests either errors in methods or the presence of the invading micro-organisms in the skin of the patient.

The selective power on the part of the horse, or better, perhaps, that only a certain few species of bacteria which may gain entrance to the fresh, living tissues can survive, seems to be well established. This power, if you please so to put it, is well illustrated in case of navel-ill, where the infection unquestionably comes from without and where many species of bacteria are brought in competition. I will describe briefly one of the cases which I have examined in exemplifying the point in question.

A colt about three weeks old. It was in good condition and seemed to be perfectly well excepting for the diseased joints. Killed for examination. The umbilical vein from the umbilicus to the liver was distended with blood, pus cells, and bacteria. All of the internal organs appeared to be normal. In both knee joints and in one hock joint there was extensive suppuration. A bacteriological examinatiou showed the umbilical vein to contain many species of bacteria, among which may be mentioned *B. coli communis*, *Micrococcus pyogenes aureus*, and a streptococcus. One of the several tubes of media inoculated from the liver developed the streptococcus ; the others remained clear. All media inoculated from the heart blood, spleen, and kidneys remained sterile. All of the tubes of culture media inoculated with the pus from the joints gave pure cultures of the streptococcus.

The cases of navel-ill which I have seen in lambs were due to an infection with bacillus belonging to the colon group and the lesions were diffuse subcutaneous, and intermuscular suppurative cellulitis.

The lesions known as botryomycosis are from the etiological standpoint the most interesting of those here included in wound infections. The cases which form the basis for these remarks were diagnosed clinically by Dr. W. L. Williams, who kindly sent them to me from his clinic for a bacteriological exrmination. They include the forms known as scirrhous cord and closed abscesses from different parts of the body. There is a difference of opinion concerning the etiology of those lesions. Bollinger, Rivolta, Rabe, and Johne have found in them a peculiar species of micro-organism which has been given a variety of names, but generally designated

[1] Moore, *Am. Vet. Review*, Jan., Feb., and March 1900 ; Gay, *ibid.*, March 1901.

in more recent publications as *Micrococcus ascoformans.* These authors look upon botryomycosis, in consequence of this single causative agent, as a specific disease. A number of works on comparative surgery and pathology treat it as such. On the other hand, Kitt, Hell, and De Jong have failed to find its organism, but in its stead they isolated *Micrococcus pyogenes aureus.* Whether other bacteria or fungi are involved in these lesions does not seem to be clear.

In my study of this disease, I sought diligently for the supposed specific *M. ascoformans* in cover-glass preparations, in many and varied cultures, and in sections of the thickened cord and walls of the closed abscesses, but invariably with negative results. During the last two years, I have thus examined six cases reported by the surgeon in charge to be characteristic botryomycosis. Four of these were in the spermatic cord, and two were closed abscesses located elsewhere on the body. From three of these, the two abscesses and one cord, I obtained pure cultures of *M. pyogenes aureus.* All of the media inoculated from the other three cases remained sterile. These were all of long standing.

The micrococcus obtained from one of the abscesses was very virulent both for rabbits and horses, In the inoculated horses extensive suppurative lesions developed in four days. The rabbits died of septicæmia within thirty-six hours after inoculation.

In another case of infection following castration, pure cultures of a streptococcus were obtained from the inflamed cord. This organism, however, cannot be considered as a causative factor in scirrhous cord, as the lesion was too acute and recent to indicate what the final outcome might have been.

In one of the scirrhous cords of long standing, and from which the bacteriological search gave negative results, the firm fibrous tissue of the much thickened part contained numerous pockets filled with a soft, spongy tissue, in which were embedded minute masses of growth resembling the ray fungus of actinomycosis. Sections of this tissue were sent to several pathologists for opinions, and without exception they all pronounced the masses of a fungus nature and probably that of actinomycosis. This is suggestive in the light of the good results obtained in treating this disease with iodide of potash, as reported and advocated by Thomassen and others.

Finally, the conclusion seems to be warranted, at least for a working hypothesis, that botryomycosis is not a specific diseased condition, but that it is the result of infection with any one of several micro-organisms, among which *M. pyogenes aureus* seems to be the most common.

With these somewhat general and simple statements, which are here offered for discussion, the subject must rest until the results of additional and more extended investigations may be recorded.

ABSTRACT FROM A PAPER ON ANTHRAX AND PREVENTIVE INOCULATION IN LOUISIANA.[1]

BY W. H. DALRYMPLE, M.R.C.V.S., BATON ROUGE, LA.

I THINK I can truthfully say that the control of anthrax, and the possible eradication of the infection, is one of the most profound problems that confronts the agriculturist and stock-owner, as well as the veterinary profession, in Louisiana and the contiguous States. Such an unfortunate condition as has existed, and as at present exists, with us, is, to my mind, solely due, up to within recent years, to ignorance of the true nature of the disease, and of the most effective sanitary measures for its control.

The channels by which the organism gains entrance to the circulation are generally recognised as three, viz.—The alimentary tract, the skin, and the lungs. I have seen it recently stated that "authorities, without exception, were agreed that the almost exclusive method of infection in cattle was by taking the germs in adhering to food, or in drinking water." This may hold good in some countries, but the opinion does not altogether agree with my own experience in Louisiana.

True, I believe that first cases result from infection in this way, especially where no precautions had been taken to properly dispose of anthrax carcases in previous years, which unfortunately has been the case in my State. But I think there can be no question that the different varieties of horse-flies (*tabanidæ*) and other blood-sucking insects are more responsible than any or all other agencies combined in spreading the disease in the Lower Mississippi Valley. Of course the first cases are responsible in providing the source from which these hordes of insects obtain the virulent material for inoculation.

Let us devote a few seconds to the consideration of a case that is an early victim of the disease, and which has been left exposed on the surface of the ground, and see how we can charge responsibility of spread to such a source. At and immediately after death, the blood is simply swarming with anthrax bacilli. It is a common occurrence in Louisiana to witness thousands of blood-sucking flies loading up on the virulent blood at this time, and it is almost immediately succeeding such occurrence that we begin to find numerous cases of anthrax of the external or carbuncular form, and at points widely separated, the *tabanidæ*, as you are no doubt aware, being exceedingly strong on the wing, and capable of flying immense distances.

On account of rapid decomposition of the body, and the evolution of gases after death, we have bloody discharges issuing, probably by pressure from within, from the natural openings. This virulent material exposed to the air, permits of the bacilli contained within it undergoing the process of sporulation, contaminates the surroundings with which it comes in contact, besides becoming a source from which other varieties of fly-scavengers, which do not puncture the skin, can obtain the virus on their mouth-parts and feet, and are then capable of transmitting the infection to susceptible animals having abrasions of the skin. Grass, herbage, and other food materials grown upon the soil contaminated by the charbonous discharges from the dead animal may, and often do, as has been proved in many

[1] Abstracted from the Proceedings of the American Veterinary Medical Association for 1901.

instances, become infected by the adherence of spores to these materials, and cause outbreaks, not only in the vicinity of the victim, but wherever such food-stuffs may be transported. Virulent discharges from the carcase that have been washed by rains into running water may not only contaminate the water supply of live-stock in the immediate neighbourhood, but by receding, after a freshet, infect the grazing along the banks of such water-courses. Our valuable scavengers, the buzzard and the carrion crow, are no doubt responsible for spreading anthrax infection from the dead animal; for, after soiling their feet by walking over the blood and offal, as well as by other means, they are capable of producing fresh centres of the disease on the grass fields and other places on which they alight. Hogs or swine, many of which, with us, are not under the immediate control of their owners, spread the infection by first of all contracting the disease themselves, as well as carrying infection on their feet and snouts, then dying at some distance away and creating new foci, and sources from which more virulent blood may be obtained. Similar allusion may also be made to the wandering cur-dog.

These are some of the commoner agencies with us by which infection is spread from the early victims or first cases left unburned or uninterred, which, however, does not include the skinning of carcases through ignorance of the danger to the operator, or of distributing the infection by such procedure. But in addition to the carcases of the domestic animals as sources of the virus, we occasionally have, in extensive epizootics, some of the wild animals, such as deer and others, in our swamps and woods, becoming affected, and thus enlarging the infected areas.

Such, I may say, has been the condition of affairs with regard to anthrax in Louisiana. For how long, no one knows; but, at all events, from a time antedating the recollection of our oldest inhabitants.

Fortunately, I am pleased to be able to say, the situation is beginning to show marked evidences of improvement, as the result, I presume, of a persistent effort to inform our people concerning the true nature of the disease, how it may reasonably be prevented, and the great importance to be attached to strict sanitary measures for its control and possible eradication, although the latter is improbable in the near future, owing to permanently infected areas and other unfavourable existing conditions.

The internal form of anthrax is, of course, produced by the ingestion of food or water infected with the specific organisms of the disease.

External or carbuncular anthrax can be brought about through any medium by which the infective germ is brought in contact with the superficial circulation or absorbent vessels. Many of these may be readily imagined, but there are one or two recorded cases in man that may be of special interest. Some year or two ago a case of death from malignant pustule was reported in which an employé of the London General Post-office became infected through an abrasion or sore on his hand while handling a piece of leather out of which he was making box-hinges. And the fact has been established, I believe, that even the ordinary tanning process now in vogue is not sufficient to destroy the virulence of the anthrax spore. I have observed also in an English medical journal or magazine, where one or two boys in one of the manufacturing towns succumbed to this disease as the result of cleaning the parts of a carding mill, they at the time having cuts or wounds on their hands. Evidently the mill must have had wool from charbonous sheep previously passed through it.

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It is to the horse or gad-fly, however, that I desire to make special allusion, as being, in my opinion, the most potent factor in the spread of carbuncular anthrax in Louisiana.

No one who has not been an eye-witness can have the most meagre conception of the appalling numbers of these *tabanidæ*, during certain seasons, in what might be termed the anthrax districts of our State. I understand there are something like 300 species of this family of flies, and that about 150 of them occur in North America. Porchinski, a Russian entomologist, who has made some study of the life-history and habits of this hitherto somewhat neglected order of insects, states that "water and arboreal plants are the chief conditions of the existence and multiplication of the family to which horse or gadflies belong; and where these conditions are absent no *tabanidæ* are observed." All such favourable conditions we possess in abundance in the sections of Louisiana which suffer most from anthrax. For instance, at the back of many of our plantations are woods and moist places, such as swampy lands, and it is to those uncultivated portions of the properties that the remains of all animals have been committed. All carcases have been treated alike, whether charbonous or otherwise, viz., dragged or hauled out to the "bone-yard," and there left exposed on the surface of the ground. This practice has been in operation almost from time immemorial (although it is now changed for the better in most places), with the result that infection has been yearly added to the surroundings. Now, we find that first cases usually occur amongst animals, frequently cattle, in the neighbourhood of these infected areas. With the development and multiplication of the flies, and the blood of the first victim at hand to feed upon, it may readily be inferred how the infection is scattered broadcast.

It has generally been observed that outbreaks of anthrax, in epizootic form, in Louisiana, usually succeed protracted seasons of drought in summer, and after the breaking of such drought by the first few showers of rain. On the other hand, the disease rarely occurs over an extended area, and, if at all, in only sporadic or enzootic form, during seasons in which we have frequent and copious precipitation. This may be accounted for, first of all, by the fact that a lengthened dry spell of weather favours the development and multiplication of greater numbers of the horse-flies, which would be destroyed in the oval or larval stages by incessant heavy rains during these more delicate stages of insect's life.

Then, again, the moisture from the showers, following the dry weather, combined with the natural heat of our summers, brings about conditions favourable to the development of latent bacterial life already in existence in infected localities.

When heavy and frequent rains continue during our summers, we seem to have fewer of these flies, for the reasons, no doubt, just stated, and it is reasonable to presume that a great deal of the infection is washed from off the surface of the ground and of the vegetation, and carried away by running water, as streams, rivers, &c. This, of course, creates a menace to territory below, and through which such water passes. As an instance of this, we got infection on the pasture of our State experiment station through the discharges of a charbon victim, belonging to a neighbour immediately above us, being washed into a branch which runs through it. And, the lands of our State bordering on the Mississippi River might easily be infected from the State of Mississippi to the north of us, as I understand

numbers of the victims of the recent terrible epizootic there, before the authorities took action in the matter, were thrown into the river to float down.

The third mode of infection is by way of the lungs or respiratory tract, but, although the human subject contracts anthrax as "wool-sorters' disease" by inhaling the dessicated spores from the wool of sheep that has been soiled by infected blood, I do not think that animals often receive infection in this way, and, if so, it is of somewhat rare occurrence. At all events, I should consider this mode quite infrequent as compared to the others mentioned.

Preventive inoculations were first made by Toussiant, but were apparently unsuccessful in obtaining the desired results. Pasteur, however, demonstrating that immunity was produced by weakened virulence on the part of the organism, obtained an attenuated virus by cultivating the bacterium at a temperature of 42 to 43 deg. C. in the presence of oxygen. There are other processes of preparation of the virus, but the lymph that I am most familiar with, and the one which has been put into practice in almost all Continental European countries, is that prepared by the Pasteur method. The dose of this virus comprises two inoculations. The first lymph or first half of the dose is that which has been cultivated, under the conditions above mentioned, for about 24 days; the second lymph, for about 12 days. The first dose is, therefore, the more attenuated, and seems to be somewhat preparatory to the second, which is more powerful. An immunising dose requires one quarter of a cubic centimetre of each strength given from 10 to 14 days apart.

The records of preventive inoculation by the use of the attenuated virus, especially in European countries, seem to be extremely gratifying. And I think I can confidently assert that excellent results have been obtained in Louisiana when all the conditions were favourable, such as good material, strict antiseptic care observed in its use, and the operation performed early in the season, so as to secure immunity before the advent of the hot months, during which the disease usually makes its appearance.

With the exception, perhaps, of a very few individual planters who imported virus direct from France, preventive inoculation against anthrax was but little known or practised in Louisiana previous to 1896.

In that year we had an extensive outbreak in the northern portion of the State, but in a section containing all the conditions favourable for the propagation of horse-flies to carry abroad the infection; and I certainly never before witnessed such a "fly-plague." It was at this time that I suggested the use of the anthrax virus, and the doses used that season throughout the State amounted up to some thousands. Since then the use of the lymph has been fairly general, especially in the localities in which anthrax had been prevalent as well as in those contiguous, until, during the past summer, the large number of about 30,000 doses of the Pasteur lymph alone have been used.

It is difficult to obtain accurate data with regard to the positive results of preventive inoculation in Louisiana, the work of vaccinating having fallen, to quite a large extent, into the hands of those with a very limited knowledge, if any, of the importance of strict antisepsis. Some of the untoward results arising, in consequence, may here be noted: Extensive septic infection from dirty instruments, &c., and in some cases from infection of the virus through careless handling, such as frequently opening the

vial before its contents were all used up. Using wrong virus. I have it on good authority that black-leg vaccine has been used on several occasions for anthrax lymph ; the reason for the error being, I presume, due to the fact that the black-leg vaccine is frequently labelled for symptomatic charbon or anthrax, and the operators being ignorant of the difference. Quite recently, I have observed, through our daily press, that a number of cases of tetanus had followed vaccination for anthrax. It is difficult to account for this, except through the proper precautions being neglected during the opera tion ; through after-infection of the inoculation punctures ; or through virus infected with tetanus organisms. If the latter, it shows how completely the veterinarian is dependent upon the reliability of the manufacturer and vendor of these products. Want of due protection and care of inoculated animals before complete immunity is established, in the midst of an epizootic of anthrax, has also brought about indifferent results, &c.

The best season to vaccinate in our climate is almost any time before the heated term, so as to permit of complete immunity before the climatic conditions appear that are favourable to the development of bacterial and insect life.

Personally, I have vaccinated only a few hundred head of stock, the most of the work in recent years being done by practising veterinarians, managers and owners of plantation and farm stock, a few physicians, and a number of "quack vaccinators." Although I wrote to several practitioners in the State for the results of their experience with preventive vaccine, I failed to get a response in the majority of instances.

I have a record from a physician who assisted in inoculating stock in the 1896 epizootic in North Louisiana. During the height of the outbreak he vaccinated some 250 head of horses and mules with the Pasteur lymph. After the first inoculation about 3 per cent. showed symptoms of the disease, but not more than 50 per cent. of the 3 per cent. died. After the administration of the second lymph there were no more deaths, with only a few animals exhibiting symptoms. At the same time, however, unvaccinated animals in the neighbourhood were dying with great rapidity. During this same outbreak there were other somewhat similar records, but I have not the exact data. In the spring of 1897 I vaccinated over 200 horses and mules in one locality, without a single case, so far as I know, of œdema at the point of inoculation larger than a pigeon's egg. Vaccination has been carried on since in this vicinity, but I have not heard of a single death, although the disease was in the neighbourhood this summer.

In 1899 the owner of five large sugar plantations, with an aggregate of 368 mules, furnished me with detailed statistical results of vaccination that summer, a summary of which is as follows, viz.: Thirty-nine cases, and fourteen deaths, or—

Average number of animals taken sick, . . .	10·6
Average number died, ...	3·8
Average number of deaths of sick animals, . .	35·9

During the 1899 outbreak, and while making some investigations into the history of anthrax in different portions of the State, the owner of a large charbonous district below the city of New Orleans informed me that he had vaccinated about one hundred mules for the previous five years, and had lost only two animals during that time, one not inoculated, the other

permitted to graze on a headland over which anthrax carcases had previously been dragged. In the summer of 1899 the disease was epizootic all round the neighbourhood of this plantation, with flies excessively numerous, such being always the case during the years in which we have the most widespread outbreaks.

In my own parish at East Baton Rouge we had that same summer a few cases transmitted from a neighbouring parish in which a large number of all kinds of animals were lost. Precautions were at once taken, through the local authorities of both parish and city, to cremate all victims known to have died of anthrax, and to inoculate extensively. This put a check to the spread ; but early in the spring of 1900 a bull, which had been roaming over the locality where the disease had appeared the previous summer, died near our experiment station (to which case I have already alluded), and was the means of causing the ceath of a cow, a horse, and a mule belonging to the station. Every precaution was taken to prevent further disaster, such as cremation, thorough disinfection, and the inoculation of some fifteen or twenty head of the remaining stock. And although the animals were turned back on the pasture, about two weeks after immunity was established, where the first case occurred, there has not been a suspicious case on the place since, a period of about sixteen months.

The past summer the disease broke out in two wards of our parish. Strict attention was at once given to cremation or deep burial of the cadavers, as well as inoculation, and the disease was checked in each instance ; one ward losing probably ten animals before proper measures were adopted ; the other ward losing one mule.

An extensive land-owner and merchant of my acquaintance vaccinated this summer 127 head of mules after anthrax had broken out close to his property. I saw the animals about ten days after they had had the second lymph, and up to that time he had not lost a single one.

Dr. E. Pegram Flower, a graduate practising in the city of Baton Rouge, inoculated about 2400 animals, chiefly mules, the past summer in our State, and about 500 in the Mississippi Delta, all being exposed to infection, *i.e.*, the disease was prevalent all around the vicinity. His losses in Louisiana amounted to not more than one-quarter of 1 per cent., while in Mississippi only seven animals, out of the 500, died after inoculation was commenced, notwithstanding the fact that over 100 died in the neighbourhood previous to inoculation, the infection being of such a virulent character.

In the summer of 1899 this same gentleman inoculated some 1800 head of stock in our State, and with a loss of not over 1 per cent., which seems to me to be a very satisfactory showing in favour of the use of the preventive vaccine.

Perhaps the most convincing evidence of the beneficial effect of this method of prevention in Louisiana is the fact that, in those localities which suffered most from yearly, or at least periodic, epizootics of anthrax, before vaccination became so generally adopted, experienced, the past summer, a wonderful degree of immunity from the disease, which I think we must attribute to the fact that the use of the lymph is now almost general in those sections, and that greater attention is being directed to the more careful disposal of the dead animal, our people more fully appreciating its being the chief source from which this most deadly disease is spread.

I believe we are gradually solving the anthrax problem in the Pelican

State, and the progress we have already made is, I think, considerable and fairly satisfactory, when we take into account the amount of ignorance, superstition, and the erroneous and visionary ideas which prevailed up to ten or twelve years ago regarding the true nature of the disease, and the more potent factors in causing its spread. What we have accomplished has, in great measure, I think, been due to a persistent endeavour to educate our people; for we have no sanitary laws of much importance, and no live-stock sanitary board or commission vested with the authority to properly execute those we have. This condition of affairs, however, we hope to see changed in the near future. I question very much if ten years ago a single dose of preventive vaccine was used, or an anthrax carcase destroyed, as a sanitary precaution against the spread of the disease in our State. To-day there are probably 40,000 or 50,000 doses of vaccine used, and carcases are being much more carefully looked after, which I feel indicates some progress at least.

With years of added infection in our anthrax localities, and with such favourable climatic conditions for bacterial and insect development as we possess, complete extermination of the infection cannot be looked for in the immediate future. So we must endeavour to live amongst it by rendering ourselves immune against it until such conditions arise by which we can stamp it out. Our measures must be preventive and strictly sanitary, the importance of both of which we have been trying to impress upon our authorities and people. First of all, all preventive inoculation in the hands of competent individuals; the careful and proper disposal of all anthrax carcases, so as to limit and deprive of the source of future spread of infection; and thorough disinfection.

The question of the destruction or extermination of the horse-fly in the swampy or moist sections of our State is a monstrous one, and should be taken up and thoroughly investigated by the entomologist, either State or National. But, so far as I am able to see, there are only two methods by which the problem might be solved. One is to thoroughly drain and reclaim such localities, which I expect will be accomplished some day; and the other, although rather more unlikely, is to turn on one of our now famous "oil-gushers," and destroy the flies in their watery haunts with mineral oil, as Porchinski succeeded in doing in the forest pools in Russia.

HAY'S REACTION FOR BILE SALTS.

BY A. P. BEDDART, M.A., M.D., AND M. S. PEMBREY, M.A. M.D., FROM THE PHYSIOLOGICAL DEPARTMENT, GUY'S HOSPITAL.

In the second edition of Landois and Stirling's *Text-Book of Human Physiology*, 1886, Professor Matthew Hay published in a short note the fact that, when powdered sulphur is sprinkled on a fluid containing bile, it gradually sinks. He further showed that this reaction depends upon the presence of bile salts alone, and that when 1 part of pure bile salt is dissolved in 120,000 parts of water the reaction is still given; he also states that this reaction depends upon the power of bile salts to reduce surface tension. Professor Hay published no further account of his extensive experiments, which, he informs us, began in 1882, and his useful discovery escaped general recognition.

Recently two papers dealing with this reaction have been published by Frenkel and Cluzet,[1] and another by Chauffard and Gouraud,[2] in all of which the test is ascribed to "Haycraft" instead of to Hay. And we, in ignorance of the previous work, and only knowing the test as the "sulphur test," have again covered some of the ground for the third time.

Our object in writing this note is to correct the partial misunderstanding as to the name of the investigator who discovered the test, and further, to draw more attention to its clinical value.

The fluids in which a delicate test for bile salts would be most useful are vomit, fæces, and urine. Hay's test, however, is less reliable in the case of vomit and fæces than in that of urine. For it has been shown that substances other than bile salts, which also have the power of reducing surface tension, may occur in vomit and fæces, and might under special circumstances be present in sufficient quantity to introduce a serious fallacy. The most important of such substances are alcohol, ether, chloroform, acetic acid, acetone, turpentine, phenol, skatol, and soaps. In the majority of these the power of reducing surface tension is small as compared with that of bile salts.

With urine the case is different, for none of the normal constituents give the reaction. None of the substances other than bile salts, which do give the reaction, have ever been found to occur in urine in sufficient quantity to introduce a fallacy, and there is no drug at present known which, when taken, invalidates this test.

The simplest method of carrying out the test is to place the urine in a test tube with a diameter of about 1 inch, and to throw some sublimed or finely powdered sulphur upon it. If any begins at once to fall in the urine there is at least 1 part of bile salts per 10,000. If none falls at once, then, after waiting one minute, the test tube is given a very gentle shake; if sulphur now begins to fall, there is at least 1 part of bile salts per 40,000, and so on for further dilutions.

Few precautions are necessary. The urine must be free from air bubbles, it must be clear, and if it is necessary to clear it, this must be done by filtration and not by heat. For all specimens of urine at the temperature of the body give the reaction at the end of one minute, owing to the effect that heat has in lowering the surface tension of a fluid; therefore, in every case before the test is applied the urine must be cooled to about 17° C. The reaction of the urine and its specific gravity do not in any way affect the accuracy or delicacy of the test.

The delicacy of Hay's reaction as compared with that of Pettenkofer is very great; or, apart from the fact that in applying Pettenkofer's test to urine, there are so many fallacies as to render it almost useless; 1 part of bile salts per 1000 gives only a doubtful Pettenkofer's reaction.

Many urines in various pathological conditions have been tested, but no case giving the reaction has yet been found in which the clinical condition was not such as to make the presence of bile salts in the urine possible. Thus it has been found that Hay's reaction is frequently given by the urine from cases of backward pressure in cardiac and pulmonary disease, and in cases of suspected cirrhosis of the liver; even when bile pigments were shown by the iodine test[3] to be absent. In two cases of suspected

[1] *Journal de Physiologie et de Pathologie Generale*, 1901, tome iii., pp. 99 and 151.

[2] *Ibid*, p. 461.

[3] This test has a delicacy of about the same as that of Gmelin's test, but is free from the latter's fallacies in the urine.

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cirrhosis of the liver the reaction was given only intermittently, being present on one day and absent on the next. In a case of gall stones with jaundice, which was operated upon and the obstruction removed, bile salts were found present in the urine for a fortnight after the bile pigments had disappeared, and when the patient in appearance was quite free from jaundice.

It has further been noticed that jaundiced patients differ greatly in the relative amounts of bile salts and bile pigments which their urine contains. For instance, the urine from a case of cirrhosis of the liver, which was scarcely darker in colour than the normal, was found to contain large quantities of bile salts; on the other hand, in two cases of secondary growths in the liver, and in one case of gall stones, in all of which the jaundice was very intense and of some months' duration, the urine, although almost black with bile pigment, was found to contain but little bile salts.

Hay's test is so simple that it certainly deserves more extended use in clinical work, especially in investigations upon the relative excretion of bile salts and bile pigments.—(*British Medical Journal.*)

THE VETERINARY ASSOCIATION OF MANITOBA.

THIS Association held its Twelfth Annual Meeting in the City of Winnipeg on February 19th. The President, Mr. W. A. Dunbar, occupied the chair.

A letter from the Secretary of the Winnipeg Humane Society was read, asking the views of the Association upon the overhead check. After a full discussion of the subject, it was moved by W. A. Dunbar, seconded by Mr. J. A. Stevenson—"That this Association, while deploring the fact that some cruelty is inflicted upon horses by excessively high checking with the overhead check, and anxious to do all in its power to mitigate the evil, also admits that the said check can be used without inflicting pain, and in some cases, such as kicking and hard pullers, is absolutely necessary for their control and the safety of their drivers, and the Secretary is hereby instructed to reply to the Humane Society in terms of this resolution."

A resolution was passed to memorialise the Dominion Government to appropriate a sum of money for the investigation of the disease of horses commonly known as "Swamp Fever," which is continuing to cause great losses in parts of Manitoba and the North-West Territories.

HYGIENE OF DAIRY PRODUCE.

F. LOEFFLER (*Deut. med. Woch.*, Nos. 51 and 52) deals in minute detail with the methods of safeguarding against the noxious effect of altered dairy produce. He includes milk, butter, cheese, butter-milk, and whey. He points out that the method of mixing large quantities of milk from various sources is fraught with many dangers, and calls for special treatment. Milk is, as he says, a secretion which can easily be influenced by different kinds of causes. Certain forms of food may be non-poisonous to the cows, and yet form poisonous substances in the milk. He deals with Braungart's assertion that summer diarrhoea of children is in great part due to the in-

gestion of the plant *Colchicum autumnale*, which grows plentifully on chalky soil, but leaves the matter as unproved. But it is certain that many forms of food are directly noxious to the milk. The Prussian law has laid down fairly strict rules as to which forms of fodder may not be given to milch cows which are to supply nursery milk. Another danger exists in using the milk taken from cows which are being treated by a variety of drugs. This may occur without any wilful deceit on the part of the owner of the cow. Dealing with infective diseases, he dismisses foot-and-mouth disease as causing but little danger to human beings who take the milk. The milk should, however, be heated to 85° C., which temperature, according to Uhlenhuth, suffices to kill the micro-organisms of the disease. Mastitis in cows is a grave danger. The milk may produce intestinal inflammatory lesions by the presence of streptococci. The danger is greater than one would imagine, since the milk of a single cow suffering from mastitis may infect very large quantities of milk from other cows. Since the German law forbids the sale of milk obtained from cattle suffering from anthrax, pleuro-pneumonia, cow-pox, and hydrophobia, it is unnecessary to deal with the effect of these diseases on the milk. Tuberculosis of cattle is, however, of great importance, for its distribution in all countries is extremely wide. When the milk is mixed from many cows, and even from many farms, one is almost certain to be able to find tubercle bacilli in it. In butter, bacilli are also very frequently present, and also in cheese. Tuberculous disease of the udders of cows affects between 1 and 2 per cent. of all milch cows, while other lesions of the same nature are found in between 40 and 50 per cent., or even higher. The milk of the former certainly contains tubercle bacilli; but, according to Ostertag, the milk of cattle which react on the tuberculin test but have no disease of the udders rarely does so, and therefore present no especial danger. Loeffler gives a summary of Koch's statements at the British Congress for Tuberculosis, and absolutely endorses all that he said. He recounts the investigations of Ernst, but finds that the only reply to his circular (sent to medical practitioners and veterinary surgeons in America) of importance was that of Peabody. It appears from this reply as if a baby had been directly infected with tuberculosis by the milk of a tuberculous cow, but the subject requires much more exact investigation. On the other hand, Baumgarten reports that twenty years ago an attempt was made to inoculate a medical man who was suffering from an inoperable sarcoma with the bacilli of bovine tuberculosis, by way of experimental treatment. In spite of a considerable quantity of bacilli having been introduced beneath the skin, neither local nor general tuberculosis resulted. He deals in further detail with this question. Milk and its products may be the carriers of other infective organisms; for example, typhoid, diphtheria, and scarlatina. The first-named is frequently carried by milk, while there is some doubt existing as to whether the second disease can be spread by contaminated milk. That scarlatina is at times so caused is proved by English literature. Loeffler will have nothing to do with the addition of chemical reagents which inhibit the growth of various organisms which may be present in milk. He recommends the coagulation test with alcohol to discover such "doctoring." The only way to deal with infected milk is to heat it. Against so-called "milk dirt" he advises filtration, preferably carried out according to Fliegel. Milk that has been heated to 85° C., and filtered, should be kept at a very low temperature if it has to be sent away to the consumer. The heating need only be kept

up for one or two minutes, and is best carried out in a pasteurising apparatus. Cream, too, can be pasteurised without spoiling it, and the butter made from it will be found to be pure and good to taste. There appears to be some difficulty in preparing cheese from pasteurised milk, but Klein contends that even after heating to 90° C. a milk can be turned to cheese, by the addition of a small portion of ripe cheese, in fifteen minutes, and Hamilton states that after heating to 102° C. the addition of sour milk will suffice. Even after all this care has been expended on milk and its products in the dairy the danger is not over. In the household of the consumer it should be again subjected to a temperature of 70° to 85° C. for thirty minutes, and cooled down in the same vessel, which, of course, must be very clean. In the dairy all utensils, &c., must be sterilised with boiling soda solution. Although he says that the subject is not by any means exhausted by his account of it, he claims that with these precautions the risk of harming the whole population, and especially the juvenile portion of it, will be very greatly diminished.—(*British Medical Journal*, March 22.)

MEAT INSPECTION IN GLASGOW.

The Health Committee of Glasgow Corporation have now issued a draft of the revised bye-laws for the inspection of carcases, meat, and flesh brought into the city, and for the treatment of such as are found unsound. According to the provisions of the bye-law, every carcase, or portion of a carcase, whether fresh or salted on the surface only, or chilled or frozen, intended for human consumption, shall, before being exposed for sale, whether wholesale or retail, be conveyed by the person bringing the same into the city to one or other of the examination stations appointed by the Corporation for inspection by the veterinary surgeon of the Corporation, or his assistants. Carcases slaughtered in any public slaughter-house outwith the city may be brought into the city and exposed for sale direct, provided they bear evidence by official stamp or mark, and by certificate to the satisfaction of the veterinary surgeon of the Corporation, of having been inspected and passed by a recognised and competent inspector. Carcases not slaughtered in a public slaughter-house shall be sent to the examination station for inspection, and shall be accompanied by the kidneys, lungs, liver, heart, head, stomach, fourth stomach of ruminants, and spleen, and also in the case of females by the uterus and udders, in such a manner as the organs shall be easily recognised as part of and belonging to their respective carcases. Certain exemptions are provided for. Clause 5 provides that joints of every carcase, or portion thereof, shall, before being removed from any of the examination stations, be marked with an official stamp by the veterinary surgeon of the Corporation. Clause 8 provides that every carcase or portion of a carcase not passed by the veterinary surgeon as fit for human consumption shall forthwith be removed to a knacker's yard and destroyed, unless the owner or consigner intimate in writing within forty-eight hours that he intends to contest the matter in a Court of Law, in which case the carcase in dispute will be retained by the veterinary surgeon for production in or inspection by the Court. The penalty for contravention of or failure to carry out any of the bye-laws is a sum not exceeding five pounds, and the alternative sixty days' imprison-

ment. Before finally approving of the bye-laws, the Health Committee have agreed that conferences be held with the Glasgow United Fleshers' Society, and the Scottish Provision Trade Association.

Legal News.

DISEASED MEAT CASE IN EDINBURGH.

In Edinburgh Police Court on 8th March, before Sheriff Henderson, Alexander Scott, farmer, Pittenweem, was charged with being the owner of a cow deposited in Messrs. Oliver & Son's fat stock saleyard, Valleyfield Street, Edinburgh, on 11th February last, which was unsound and unfit for human food. He pleaded not guilty, and was defended by Mr. Clay, W.S. For the prosecution, Dr. Williamson, Chief Sanitary Inspector for the city of Edinburgh, said that on Tuesday, the 12th of last month, he noticed a cow being driven in the direction of Messrs. Oliver & Son's yard. In consequence of what he saw, he asked one of his inspectors to go to the saleyard and see the animal. Witness noticed that the cow was apparently extremely ill, and in a very emaciated condition, being hardly able to walk. Shortly afterwards he visited the slaughter-house and saw it there. The carcase was that of a very thin animal. The meat was very soft and dropsical, and was obviously unfit for food. To a person who knew anything about cows, it appeared to have been suffering from something serious for a long time. The journey in the railway train and the walking to the saleyard would make a change in the symptoms of disease, but not in the appearance of the animal. In cross-examination witness said that the cow was suffering from heart disease and also stomach disease. Other witnesses corroborated, one stating in addition that the cow was suffering from heart disease, the heart being penetrated by two pieces of wire, which also caused the animal considerable pain. For the defence, the respondent said that he had bought the cow from a veterinary surgeon, which he considered was a very sure sign that the animal was all right. The cow appeared quite well when it left his farm. Principal Williams, of the New Veterinary College, Edinburgh, said that his examination of the cow led him to the conclusion that she was suffering from a form of heart disease. He found two pieces of metal which had penetrated the stomach towards the heart. They had not entered the heart, and his opinion was that the animal had only commenced to have the heart affection. The railway journey and the driving from the station to the yard would not only aggravate the condition of the animal, but would even develop the disease. The Sheriff, in his decision, held that the meat was unsound and unfit for the food of man, and that the carcase had very properly been destroyed. It had, however, been conceded on all hands that the journey aggravated the disease, and, having regard to the evidence of Principal Williams, the Sheriff said he was prepared to hold that the respondent had discharged the *onus* upon him of proving that with reasonable care he could not have known the condition of the animal. He therefore dismissed the respondent.—(*Scotsman.*)

Extracts.

COLIC OF RENAL ORIGIN, WITH ALBUMINURIA AND HEMATURIA IN THE HORSE.

In reporting this case to the Société Centrale M. Brun reminded his hearers of the custom so common amongst grooms and stablemen of attributing colics to retention of urine, whilst veterinary surgeons generally seek for their cause in intestinal disorders, such as involutions, strangulations, and ruptures. On 11th December last he found a nine-year-old gelding, which had to his knowledge been for the preceding four years in perfect health, suffering from quite unusual agitation; it refused all food, and kept shifting uneasily from side to side, without showing any desire to lie down. The day before had been very cold, but the animal had done its work in the ordinary way, and on its return to the stable in the evening nothing abnormal was noticed. At ten A.M., on the 11th, M. Brun observed the following symptoms: excitement, skin dry, but cold at the extremities; pulse weak, almost imperceptible; mucosæ discoloured, that of the mouth moist as in the normal state; back rounded and stiff, no rumbling, flanks somewhat hollow, no inflation, no signs of gorging, belly soft. He prescribed etherised draught, mustard blister on the lumbar region. At six o'clock no change. Injection of eserine and pilocarpine (10 cubic grammes of pilocarpine and 6 of eserine), and a walk about the stable, with a rug. At ten P.M. no improvement. The horse was put into a loose-box, and began turning about in one direction and another; then lay down cautiously, and remained motionless. After a few minutes M. Brun got him up again with difficulty; the animal was afraid of efforts, but M. Brun had to get him up, as he wished to make a rectal exploration. In performing this he was struck with the emptiness which his hand found in penetrating into the abdomen. The organs were soft and not distended; the bladder was fairly full. After the withdrawal of M. Brun's hand the animal voided with much pain a few drops of dark, coffee-coloured urine. M. Brun left after prescribing an injection of 25 grammes of morphine to be given in the middle of the night if the colic pains continued; he also gave orders to keep a quantity of the urine, if possible. One symptom struck M. Brun especially, namely, the astonishing heaviness of the animal's head; on giving him the slightest support, as in taking the pulse or examining the mucosæ, he sank the whole weight of his head, making no effort to support it, and if M. Brun made with his finger a slight pressure on the nape of his neck, the point of the nose was at once lowered to the ground. On the following morning, at seven o'clock, M. Brun found the animal in the same condition; the injection of morphine had not stilled the pain, but the head was not so heavy; the conjunctiva was slightly coloured, the right flank inclined to inflation. M. Brun made injections of ether to try to get up the pulse, which was still imperceptible, and left the horse to the care of an assistant, taking with him for analysis half a litre of evil-looking dark urine. At one P.M. the animal's flank became so inflated that asphyxia was threatened; the assistant was obliged to puncture the cæcum and bled the animal slightly; the signs of compression of the lung disappeared at once. At eight P.M. the pains had begun to abate, and the animal drank a little water, but would eat nothing. Next day all the alarming symptoms had disappeared, but there was great weakness and the pulse remained

difficult to perceive. Intestinal rumblings were audible, and with them came fæces, which had not been seen for two days.

ANALYSIS OF THE URINE.

"Urine of brown colour and viscous consistency. This viscosity increases when left undisturbed, and probably by cooling. This morning (13th December) it is syrupy and presents great quantities of albumen; all the characteristic processes of this element permit us to affirm that it is present in a very great proportion. Microscopic examination—presence of hæmatin in small quantities, numerous leucocytes, crystals of oxalate of lime, fragments of various epithelia (cells, tubes, &c.). This urine is characterised in the first place by the enormous proportion of albumen. It contains a little blood and a little pus; it is quite certain that the small quantity of blood and pus found cannot justify the quantity of albumen; the latter, therefore, is mostly of renal origin."

A few days later the horse had recovered all the signs of health, the pulse had returned gradually, the loins had regained a wonderful suppleness, all the great functions were going on normally. On the 20th December a fresh analysis of the urine was made and gave absolutely negative results with regard to the abnormal elements found eight days before—albumen, hæmatin, leucocytes. In addition it had regained visibly during the last four or five days its usual colour and appearance. This is clearly a case of an animal which at a given moment had congestion of the kidneys with albuminuria and hæmaturia, and at the same time grave digestive troubles. There seems no doubt that the renal troubles brought about the digestive troubles—the constipation, inflation, loss of appetite. Perhaps such cases are less rare than we imagine.

M. Brun gave details of another case which came under his notice. A cab-horse was kept waiting one cold wintry night at the door of a theatre; next morning its hind legs were swollen, but after being walked about for a bit the swelling disappeared, only, however, to return when the animal was put back into its stall. In the evening a severe attack of colic came on, which continued till the next morning. An etherised draught and an injection of morphine were administered without giving relief; at last the colic pains ceased and the animal seemed cured, when, two days later, it was seized with a sort of paresis of the hind-quarters which lasted for several months, and had not up to the time of speaking quite disappeared. When examining the horse M. Brun found that it urinated with difficulty, and that the penis was pendant. The urine, on examination, was found to contain neither blood nor leucocytes but great quantities of albumen; it was therefore quite probable that an attack of nephritis had produced the colic forty-eight hours previously. Examination of urine, M. Brun went on to remark, except in cases where the colic is clearly traceable to digestive disorders, is very important in diagnosis. In both of these cases it seems that the morphine had no prompt or decisive action on the element of pain. Perhaps also, added M. Brun, if he had known sooner he would not have made the injections of eserine or pilocarpine, which were useless if not harmful. At any rate the condition of the loins prevented him from administering his usual copious saline purgative, which, in the circumstances, would have been wrong.

(*Recueil de Méd. Vét.*, 28th February 1902.)

XUM

PLEURO-PNEUMONIA OF THE MAMMARY GLAND—CULTURE OF THE VIRUS IN THE MILK.

THE mammella in function has great difficulty in defending itself against microbic infection. It is sufficient to place in the lactiferous sinus of the cow or goat which is suckling a small quantity of anthrax-infected blood or bacterial culture in order to kill the animal in a few days, even when the operation has been performed—and this is quite easy—without lesion of the gland or of the mucosa of the teat. The same results are obtained when we inject into the teat of a suckling cow or goat a little tuberculous culture of bovine origin; there is developed in a few days tuberculous mammitis, which goes on at a gallop and kills the animal in a few weeks without the post-mortem revealing any other tuberculous lesions than those of the inoculated mammella or the adjoining ganglia. Analogous results have followed the injection into the mammella of a little foot-and-mouth virus. Very rapidly the quantity of milk produced diminishes to the extent of one-half, two-thirds, or three-quarters, and the milk itself is injured and becomes granulous. Frequently the animal has fever for twenty-four, thirty-six, or forty-eight hours; sometimes, though not often, an aphthous eruption is produced, generally confined to the mucosa of the mouth, then, bit by bit, order is restored, and the inoculated mammella gives as much normal milk as its neighbour. After recovery, whether the operation has or has not produced aphthous eruption, the cow supports without discomfort inoculation with a virus which gives the disease to others—it is immune. An important fact to notice is that as long as the milk remains in its morbid condition it can convey the disease. In one of my experiments it remained virulent to the eighth day after inoculation, and in such a case one can obtain a considerable quantity of virus, which is important in the experimental study of a disease the microbe of which is unknown, and the virus of which resides almost solely in the contents of the aphthæ.

It was interesting to discover if the mammella would offer with regard to pleuro-pneumonia the same receptivity and the same want of resistance as with regard to anthrax, tuberculosis, and aphthous fever, and therefore the following experiments were made. On 16th September 1901 I injected into the right posterior mammella of a milch cow (No. 20) a cubic centimetre of the pleural serosity taken from a cow which had died of the disease. The injection was made with the help of a fine smooth canula introduced into the excretory conduit of the udder in order to avoid all injury to the mucosa. The serosity injected was not very virulent, for three cows survived subcutaneous injection with it. Yet even on the 19th the milk was seriously injured, being of a yellowish colour, purulent, and inclined to clot. On the 21st the mammella was hard, distended, hot, very painful when pressed; it was difficult to draw milk, and the animal resisted such attempts. On the 25th a little peripheric œdema was observed on the inoculated mammella; this œdema increased gradually, reached the abdominal wall, and soon extended to the sternum; on the 1st October it formed an enormous mass more than 10 centimetres thick, and occupying all the lower part of the abdomen. At this time the cow was eating very little, she had grown emaciated, her condition was wretched. From the 24th September onwards her temperature had gone on rising from 39° (Cent.) till it reached 40° on the 28th, where it remained till the 3rd October. For more than eight days I was in constant expectation of her death,

but she held out, and gradually regained her appetite and her cheerfulness in proportion as her temperature became normal, the œdema reduced, and the heat, sensibility, and tension of the gland diminished. On the 15th October everything seemed to be right, but the inoculated mammella remained indurated, and had not recovered its functional power; in place of milk it continued to give (and still gives) a purulent, thick, and viscid liquid. It was interesting to see if this mammary pus possessed pleuro-pneumonic virulence; therefore on the 20th November (two months after the inoculations, and more than one month after the disappearance of all local lesions) the pus of the mammella, sown direct on tubes of Martin-serum gelosed bouillon, gave an almost pure and very abundant culture of characteristic colonies of the microbe of pleuro-pneumonia. Thus, notwithstanding the long time which had elapsed since the inoculation, in spite of the immunity following on the subcutaneous evolution of the virus, the microbe was still alive in the inoculated mammella! Was it still virulent? The following experiments enable me to answer in the affirmative.

On the 19th December 1901 I injected under the skin of the left shoulder of a young cow a cubic centimetre of a second culture in Martin-serum bouillon coming from the mammary pus collected on the 19th November. On the same day I injected under the skin of the right shoulder of another young cow a cubic centimetre of the liquid obtained by triturating in a little boiled water some pus extracted that very day from the mammella of cow No. 20. Finally, I injected the same quantity of the same purulent liquid under the skin of the left shoulder of cow No. 20, with a view to assuring myself of her real immunity. Contrary to my expectations the inoculated products showed themselves to be of extreme virulence. On the sixth day there appeared at the point of inoculation an inflammatory tumour, hot and painful, which extended rapidly in all directions, invading the shoulder, the arm, the fore-arm, the breast, the sub-sternal region, and reaching as far as the hypochrondria. The temperature, which had at first remained normal, soon began to rise to a little over 40°, remained there from eight to ten days, and then fell gradually till death took place on the 9th and 11th January, scarcely three weeks after inoculation. I have rarely witnessed such a rapid evolution. As to cow No. 20, whose mammella continued to cultivate this so very virulent microbe, she showed herself absolutely impervious; at no time was it possible to find the slightest trace of the inoculation which she had undergone, and her temperature showed no variation—she was quite immunised, as I had foreseen.

From these experiments it is permissible to conclude—First, that the microbe of pleuro-pneumonia introduced without wound into the lactiferous sinus of the milch cow may bring about these lesions of the same nature as those which follow on intramuscular or subcutaneous inoculation; second, that in the inoculated mammella there is produced a genuine pure culture of this microbe; third, that long after the disappearance of the original troubles the microbe still exists, lively and virulent, in the inoculated mammella; fourth, that the microbe injected into the mammella acquires there a virulence greatly superior to that which it possessed originally.

(M. Ed. Nocard in the *Recueil de Médecine Vétérinaire.*)

Reviews.

Horses on Board Ship. By Captain M. H. Hayes, F.R.C.V.S. Hurst & Blackett, Limited, London.

The unfortunate thing about this book is that it comes too late for this war, and we trust that before we have another such war Captain Hayes will have much enlarged the present work.

It is like all of the author's works, a most readable book and full of matters of interest, not only to those engaged in the actual work but to all who love horses.

On page 12 the author gives approximate percentages of loss in transport since 1899. We think it would have been better to have divided the table and shown the average loss in 1899, 1900, and 1901, and then the reader could have seen how enormously improved the transport system has become since the beginning of the war. At the present time the loss from the U.S.A. is as low as two or three per *thousand*, and seldom two per cent.

In speaking of "stiff" and "tender" ships the author mentions the advantages of bilge keels. We would insist upon every horse transport having them. Though necessity forced our transports to carry horses or mules on the lower hatches, yet we might point out that such a proceeding is not allowed by the U.S. Government.

We quite agree with Mr. F. C. Golden, M.R.C.V.S., that there are too many division boards in the fitting of horse stalls on board ship; being so numerous they much interfere with ventilation. We think two are sufficient, and at the same time would remark that the haunch board is generally placed too high and so injures the tail.

As regards ventilation the U.S. Government insist that there shall be at least four windsails or cowls 7 feet high from deck and 18 inches in diameter, to each compartment of 50 feet; this is more than our Government allows. With respect to tying up on board, we object to chains, as they "kink" and break, and are intolerably noisy both night and day. Rope soaked in solution of aloes is much preferable and proportionately stronger. We differ very materially with the author as regards his table of dietary for horses on transport from the U.S.A.

And why he should object to carry chlorate of potash and nitrate of potash, both extremely good for sore throats and fevers, is beyond our comprehension. We would always have on board ships which had to cross the Equator a large quantity of ice—say several tons—it is cheap enough and is invaluable. With regard to mucking out, each time it is done the stench is so fearful and the danger of blood-poisoning so great, that we are inclined to think that it is better to add dry litter daily and with a shovel only lift any much-raised part.

We know of two instances in which there was not a single case of sickness until immediately after the first mucking-out.

To finish with, Captain Hayes exposes the weakness of the War Office officials in their methods of transport, and the enormous amount of snobbery among combatant officers when used as transport officers. Their airs and graces, their idiotic remarks and methods, are too well known to many of our readers to require detailing here. Perhaps in time the authorities will recognise that the veterinary officer is the proper person to take charge of a horse or mule transport, and that it is an insult to our profession to place these boys on board ship as our seniors. Captain Hayes is wroth

about it and speaks plainly, and we doubt if he is even more wroth than we are.

From the above remarks it will be seen that when once one takes up the book one doesn't put it down till read to the end.

It is beautifully got up and the photos are splendid; all praise to the publishers and printers.

A Text-Book of Operative Veterinary Surgery. By George Fleming, C.B., LL.D., F.R.C.V.S. Volume II. Price 12s. 6d. Baillière, Tindall, & Cox, 8 Henrietta Street, London.

It is not so very long since the literature on veterinary topics was remarkable for its paucity, but the student or practitioner of to-day can no longer complain that it is not getting more and more abundant as time rolls on. Even yet there are fields untouched, and we welcome any attempt, be it ever so feeble, which covers new ground. Volume I. of this work appeared some years ago, and we had almost begun to despair of volume II. ever seeing daylight. As it happens the work was not completed when Dr. Fleming died, and the author of the concluding pages is Principal Owen Williams. The latter says in the preface that "the present work was left unfinished at the death of the author, Dr. Fleming, who, however, had prepared nearly all the manuscript, with the exception of the last chapter or so. In deference to the wish of Dr. Fleming's widow and his publishers, I undertook to attend to the completion of the work, as being in a sense complementary to that of my late father, and I am responsible for the authorship of the last few pages."

The book contains full descriptions of the methods pursued in operations on the mouth, the stomach and intestines, the abdominal wall, the nasal chambers, gutteral pouches, larynx, trachea, and thorax, the urinary apparatus, the generative apparatus (male and female), the eye and its appendages, the auditory apparatus, and last but by no means the least important, a description of the various operations required by the diseases of the foot. We suppose that the latter, along with the chapter on castration, which gives detailed accounts of the emasculation of the domesticated animals from the horse down to the fowl, will perhaps prove of most interest to the ordinary practitioner.

The plates as a whole are good, particularly those dealing with the castration of cryptorchids; these latter are of assistance in helping one to understand the rather complicated anatomy of that region.

In some places the author seems inclined to get verbose, and the number of different methods described for one operation seems to be differentiated by minutiæ. For example, in extirpation of the eyeball five methods are described at length, and the only practical difference in two of them seems to be that in one the ecraseur is used, whilst in the other a pair of curved scissors wherewith to sever the structures.

At page 501, speaking of chinosol as an antiseptic, the author says it does not injuriously act upon or stain iron or steel. In this the author labours under a misapprehension.

In the treatment for hæmatoma no mention is made of the method of suturing the lips of the wound through the cartilage, which is by far the best way.

There is one point about the book as a whole to which exception may be taken, and that is this: In describing the different methods for the relief

of any one condition, no opinion is hazarded in one or two instances as to which is the best method to pursue; especially is this the case in what we may designate the classical operations. The ordinary practitioner is not performing these operations daily, but when cases are met with requiring to be done he turns to his text-book for advice as to which is *the* recommended and most successful method. He cannot always decide from a perusal of the various descriptions.

Nevertheless, containing as it does much information not generally found in the ordinary veterinary text-books, the book should prove of great benefit to all students or practitioners who want to keep abreast of the times, and we cordially recommend it.

The book is well got up, well printed and bound, it contains 344 illustrations, and does great credit to the publishers.

A noteworthy feature about the book is the index; this relates to both volumes I. and II. The numbers referring to the pages are in light type and those to the illustrations are in heavy type.

Notes and News.

THE REFERENCE TO THE REMOUNTS COURT OF INQUIRY.

Captain NORTON (Newington, W.) asked the Secretary of State for War whether, in view of the approaching debate upon army contracts made for South Africa, he would lay upon the table of the House the terms of reference issued for guidance to the Court of Inquiry on the Remount Department now sitting?

Mr. BRODRICK.—The terms of reference were as follows:—The Court will take evidence on oath and carefully consider the following matters, and will record their opinion on the various questions raised. The Court will consider the administration of the Remounts Department since the appointment of Major-General Truman as Inspector-General of Remounts in January 1899, and report (1) whether the purchase of horses at home and abroad has been conducted on the best system for the public service; (2) whether the officers selected for purchasing remounts at home and abroad were suitable and competent; (3) whether the arrangements for shipments of the remounts as they arrived at the ports of embarkation were satisfactory; (4) whether the arrangements for the care of the animals during the voyage were in all respects complete, and whether the conducting officers, veterinary surgeons, and attendants accompanying the ships were competent and satisfactory; (5) whether, in cases where the condition of the animals on landing was found to be unsatisfactory, prompt and sufficient measures were taken to prevent recurrence of the evils reported; (6) whether a regular system of reports, detailing whether the proper stamp of animals had been provided for the particular services required of them, was called for as a guidance to the relative value of the various sources of supply; (7) whether in cases of alleged fraud or negligence effective measures were recommended for dealing with those concerned; (8) whether, in view of the large demand on the Department, proper care was taken to obtain all the available information as to sources of supply; and (9) whether, allowing for the great strain on the Department, due care and ability were shown in dealing with the demand for remounts.—(House of Commons, March 11th.)

THE NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY.

THE BENEVOLENT FUND—FINANCIAL STATEMENT, 31st DECEMBER 1901.

Dr. Mr. EDWIN FAULKNER, Honorary Treasurer, Knott Mill, Manchester, in account with the Fund. *Cr.*

RECEIPTS.

1901,		£	s.	d.
Jan. 1.	To Cash at Bankers,	360	6	4
Dec. 31.	,, Mersey Docks and Harbour Board, one year's Interest on Bond for £1300 at 3½ per cent., less tax,	43	2	7
	,, Mersey Docks and Harbour Board, one year's Interest on Bond for £600 at 3⅛ per cent., less tax,	17	14	8
	,, Manchester Corporation Improvement Department, one year's Interest on Mortgage for £900 at 3¼ per cent., less tax,	27	13	5
	,, Corporation of Salford Gas Department, one year's Interest on Loan of £600 at 3 per cent., less tax,	16	19	0
	,, Income Tax returned,	11	9	5
	,, National Veterinary Association Grant,	20	0	0
	,, Do. do. Donation,	2	3	7
	,, Bank Interest,	7	7	3
		£506	16	3

PAYMENTS.

1901,		£	s.	d.
Dec. 31.	By Grants and Donations:—			
	J. T. F. £10 0 0			
	J. R. 10 0 0			
	A. L. G. 10 0 0			
	C. D. 5 0 0			
	K. C. 7 0 0			
	I. F. 40 0 0			
	J. L. F. 1 0 0			
		83	0	0
	,, Post Office Commission,	0	0	8
	,, Balances:—			
	Cash at Bankers, £425 15 7			
	Less unpresented Cheques, 2 0 0			
		423	15	7
		£506	16	3

INVESTMENTS.

Mersey Docks and Harbour Board—3⅛ per cent. Bond No. $\frac{77,534}{104,216}$ dated March 6th, 1883; repayable 27th March 1911, ... £600 0 0

Mersey Docks and Harbour Board—3½ per cent. Bond No. 71,621, dated July 1st, 1900; repayable 1st July 1914, ... 1,300 0 0

Manchester Corporation Improvement Department—3¼ per cent. Mortgage No. 1456, dated 15th November 1900; repayable 29th September 1903, ... 900 0 0

Salford Corporation—3 per cent. Mortgage No. 2233, renewed 21st December 1899; repayable 13th January 1903, ... 600 0 0

We have examined the above-written Account, and certify the same to be correct.

JNO. B. WOLSTENHOLME.
ALFRED H. POWNALL, F.C.A.

THE DEFENCE FUND—FINANCIAL STATEMENT, 31st DECEMBER 1901.

Dr. Mr. EDWIN FAULKNER, Honorary Treasurer, Knott Mill, Manchester, in account with the Fund. *Cr.*

RECEIPTS.

1901,		£	s.	d.
Jan. 1.	To Cash at Bankers,	791	14	9
	,, Cash in hand,	0	12	6
Dec. 31.	,, Subscriptions received 1901, as per List,	126	10	6
	,, Bank Interest,	16	10	8
	,, Subscriptions for 1902, received in advance,	1	1	0
	,, Balance owing to Treasurer,	2	10	6
		£938	19	11

PAYMENTS.

1901,		£	s.	d.
Dec. 31.	By Hire of Room,	0	15	0
	,, Printing and Stationery,	9	0	11
	,, Solicitor's Costs,	30	0	0
	,, Accountancy,	2	2	0
	,, Secretary's Postages and Expenses,	1	5	6
	,, Treasurer's do. do.	0	14	8
	,, Cheque Book,	0	5	0
	,, Balance at Bank,	894	16	10
		£938	19	11

We have examined the above-written Account, and certify the same to be correct.

29th January 1902.

JNO. B. WOLSTENHOLME.
ALFRED H. POWNALL, F.C.A.

CONTAGIOUS DISEASES ANIMALS ACTS, 1864 AND 1890.

SUMMARY OF RETURNS OF OUTBREAKS for the Four Weeks ending 15th March 1902.

ENGLAND AND WALES.

Swine Fever.	Anthrax.	Glanders (including Farcy).	Rabies.	Sheep-Scab (for month of February).
Outbreaks 103 Slaughtered 430	Outbreaks 39 Attacked 78	Outbreaks 80 Attacked 131	Dogs Attacked 4 Other Animals 0 Destroyed 7	Outbreaks 206
SCOTLAND.				
None.	Outbreaks 23 Attacked 31	Outbreaks 2 Attacked 5	None.	Outbreaks 49
IRELAND.				
Outbreaks 9 Slaughtered 175	None.	None.	None.	Outbreaks 37

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalieri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch-und Milchhygiene (Berlin); Buletinul Societatii de Sciinte diu Bucuresci-Romania; Annual Report for the year 1901 of the Principal of the Royal Veterinary College to the Council of the Royal Agricultural Society of England; The Meat Trades Journal.

Received for Review.—Text-Book of Operative Veterinary Surgery, Vol. II., by George Fleming, C.B., LL.D., F.R.C.V.S.

CORRIGENDA.

On page 174 of JOURNAL for March, in Editorial Note near foot of page, for "post-phalangeally" read "post-pharyngeally," and for words "per orem" read "per os."